Food Manufacture

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Ethylene Ripening.

BIOCHEMICAL RESEARCH has recently shown that tomatoes ripened by the ethylene method suffer no loss in vitamins A, B, and C; the fruit is as rich in these vitamins as that which has been picked green and ripened in air. During the past three years, ethylene has been employed to a limited extent in the ripening of fruits and vegetables on a commercial scale.

Boric Acid.

Two papers of unusual interest were recently presented before the Society of Public Analysts (see May issue of the *Analyst*). One, by A. S. Dodd, deals with a new test for boric acid and borates; the other, by Dr. A. van Raalte, discusses the freezing point method of detecting the adulteration of milk.

The best known boric acid test is the turmeric test with its modifications. Probably the most delicate is that with tincture of mimosa flowers, while for larger quantities the presence of boric acid is indicated by a green flame produced on igniting the substance with methyl alcohol or ethyl alcohol and glycerin. The test described by Dodd is based on the pink coloration produced by the addition of mannitol and Sofnol Indicator No. 1.

South Africa.

As the cultivation of pears, peaches, apricots, and other fruits increases, it is probable that South Africa will become an important competitor in the market for canned fruits.

South African pine-apples are much in favour. In Singapore production of canned pine-apples is fully maintained. Schemes for growing and canning are under consideration in various parts of the Empire where climatic conditions are suitable for the cultivation of pine-apples.

Lard Density.

German chemists have drawn attention to an erroneous statement, which has long persisted in literature, to the effect that the density of lard is 0·931 to 0·938 at 15° C. This probably originated in measurements with impure lard by the alcohol float method. It is concluded that the true range of density is approximately 0·915 to 0·923 at 15° C.

Copper.

There are always two sides to every question. There has been quite a noise over the harmful effects of copper in food; now the experts have something to say about the beneficial effects of copper. The future may find physicians prescribing the use of copper in the cure of anæmia, since it has been found by the Department of Agricultural Chemistry of the University of Wisconsin that this metal plays an active part in restoring anæmic blood to its normal and healthful condition.

The Wisconsin investigators point out that the new-born come into the world apparently well stocked with copper and iron. At an early stage of life these reserves become exhausted and the system thereafter must depend for its supply upon the food that is eaten.

The Wisconsin experiments were made with rats, and they were first made anæmic by restricted diet. When the hæmoglobin content of the rats' blood had been materially reduced, copper and iron were added to the diet of the animal. In six weeks the hæmoglobin content of the animals' blood increased about fivefold. The recovery of animals that were permitted to consume larger quantities of copper was very rapid.

Experiments have been conducted in Kentucky to determine whether the copper contained in red blood has any useful function, as its presence suggests. In reporting the results of these experiments to the

annual meeting of the American Chemical Society last year, the Kentucky investigators declared that "From the external appearance of the rats, together with the hæmoglobin readings, the authors infer that copper has an important function in the formation of hæmoglobin and in the metabolism of animals having red blood."

Minerals and Food.

It is now fairly well known that considerable success has attended the treatment of anæmia by feeding liver, liver ash, or certain liver extracts. Traces of copper occur in liver, and this in some way activates the iron which is also present and which is necessary for the formation and maintenance of hæmoglobin. Now it has been found by Titus and Cates that traces of manganese have an effect similar to that of copper. When both copper and manganese are employed in conjunction with iron, the response is more rapid than when either of the first two metals is used alone.

But this is not all. Traces of arsenic are necessary for cell life. For the growth of bones and teeth, small amounts of silicon and of fluorine seem to be necessary. The importance of iodine for normal health is now fully appreciated. Another element which appears to be required in minute quantities by the human body is zinc, but at present the part it plays is not understood.

"Militant Business."

That the application of research to American business is viewed in a thoroughly practical light is evident from a leaflet entitled "Militant Business" issued by an "efficiency" organisation. It is pointed out that the benefits that flow from practical, applied research are not confined to any one type of business —manufacturing, banking, insurance, public utility, transportation, and service concerns have equal need for it, and can use it with equal success. Research is not a luxury, to be enjoyed only by academic workers on one hand and huge corporations on the other. It is applicable to all business concerns—sick or healthy, and *regardless of their size*. It is an intensely practical means of securing more profits and then insuring those profits.

Broad adoption of research by business is inevitable, and those concerns quickest to embrace it will reap the earliest benefits. However, research will not achieve "broad adoption" until it is employed by the *average* concern, and until *all forms* are operating—*i.e.*, management, technical and marketing research. A manufacturer would not use cost accounting for but one of his products and guess at the cost of the rest; no more should he use one kind of research and ignore the other kinds.

Most of the companies making large profits in this period of "checkered" prosperity have adopted research. But it should be recognised that these concerns did not employ research *because* they were big —they used it to *get* big.

American Canning.

The 1928 exports of canned foods from U.S.A. exceeded those of 1927 in volume by nearly 16 per cent. The total value was over 71 million dollars; that of the previous year was about 62½ million dollars. The five leading countries receiving exports of canned foods from U.S.A. together account for nearly 70 per cent. by value of the total. The United Kingdom is by far the most important, taking roughly six times as much as Canada, the second most important country. It is interesting to note that the 1928 export of canned peas to the United Kingdom is a little over four times as great as the amount for 1926; in the case of tomatoes, the 1928 export is about twenty-four times greater than the amount for 1926.

Air and Health.

The modern food manufacturer in his striving after factory conditions most favourable to the well-being and efficiency of his workers, must necessarily give his earnest attention to an almost never-ending array of questions—each scarcely less important than another. One of these is the purity and physical condition of the air we breathe.

Nowadays we know that the atmospheric conditions that really do affect human beings are those associated with its smell, motion, temperature, and moisture. Human beings give off organic compounds which quickly putrefy, render the air unhealthy, and produce an irritant effect on the nervous system. In places where foodstuffs are being handled or stored, these undesirable conditions are accentuated.

Ozone, which is always present in a pure atmosphere, plays an important part in keeping the air pure and fresh by destroying the deleterious organic matter. This property has been applied to the purifying of factory air by the employment of special plant for making artificial ozone and its supply, mixed with clean air, to places where required. Dr. Leonard Hill made a special study of such ozonised air, and concluded that, owing to its powerful deodorising property, it is of considerable value in places permeated with foul odours and offensive trade smells. He states that ozonised air relieves the depressing effect of foul air on the nervous system. There is, therefore, not the slightest doubt but that the employment of an ozonising system in the factory confers very important benefits to the health, comfort, and efficiency of the workers.

Banana Vinegar.

Vinegar made from the pulp and peel of ripe bananas is light amber in colour and has an agreeable aroma and flavour. The banana mash is pasteurised at 75° for forty-five minutes and inoculated, after cooling, with *Saccharomyces ellipsoideus*. The mash is incubated for three days at 20° to 23° and then used as an inoculator for larger quantities of mash which are incubated for fourteen to twenty days. The mixture is filter-pressed and the filtrate centrifuged to remove suspended yeast. The "banana cider" thus formed contains 6½ to 10 per cent. of alcohol, and is about 56 per cent. of the weight of fruit taken. It is treated with one-quarter of its volume of strong vinegar and incubated at 30° for seventy-five days. The product is filtered and the filtrate clarified with 2 per cent. of kieselguhr and pasteurised for one minute at 60°.

Lipids.

In view of the articles we have published on the "Lipoid Content of Butter," it is interesting to note that the Commission for the Reform of Biological Chemical Nomenclature recommend that lipids (or lipoids) be divided into "tertiary lipids," containing neither phosphorus nor nitrogen and "complex lipids" containing phosphorus with or without nitrogen. The tertiary lipids are subdivided into glycerides, cerides, sterides, and etholides. In the case of the complex lipids, the term phosphatide is abolished and they are divided into phospho lipid and phosphoamino lipid. The latter group is further subdivided into (1) glycerophosphoamino lipids with glycerol as alcohol, the cephalins and lecithins, and (2) sphyngophosphoamino lipids, with sphyngosine as the alcohol.

Blanching of Peas.

In view of the great importance of blanching in pea canning, P. L. Gowen's paper to the National Canners' Convention is worthy of attention. His work on the blanching of peas was suggested by the lack of uniformity as to time and temperature conditions in practice, and was directed to acquire information on the effect of different blanches on the quality of the finished product.

The main conclusions were as follows: A blanch of 5 minutes at 180°, or 2-3 minutes or over at 206-210° results in noticeable loss of flavour. Less splits and empty skins were found at 180° than at 206-210°. The use of one pound of sodium bicarbonate per 100 gallons of water in the blancher does not soften the peas, and in some cases it improves the flavour of peas that have been held before blanching. Large amounts of sodium bicarbonate soften the peas and produce cloudy liquor.

Salad Dressing Survey.

At the request of the Mayonnaise Products Manufacturers' Association, the Foodstuffs Division of the United States Department of Commerce has undertaken a survey of the salad dressing, mayonnaise, and sandwich-spread industry. This industry has grown very rapidly within the last ten years, owing in part to improved production and distribution methods and in part to the increasing use of salads and similar foods which has brought about a greater demand for these products.

Questionnaires are being sent out to several hundred manufacturers of mayonnaise and kindred products. Plans include the gathering of statistics on production by types of product and the proportion of the output sold in various sizes of containers. A study of the methods of distribution to the trade will be included. Strict confidence will be observed as to the names and other identifying statements, but a complete summary of the results of the survey will be made public after its completion.

New Sugar Substitute.

New sugar substitutes have been sought for a long time because saccharin and dulcin are not permanently satisfactory for patients. As yet, however, only very few of the many sugar substitutes have proved valuable. Of late the I. G. Farbenindustrie has been putting *d*-sorbite upon the market, under the name of Sionon, as a sugar substitute. Sionon has a pleasant sweet taste, which, according to the reports from the medical clinic of the University of Wurzburg, was distasteful to none of the patients. The tolerance was very good so long as the quantity did not exceed seventy grams and the "sugar" was not all given at the same time. Sionon could also be used in condiments, although it must not be heated above 60° C. Its general applicability will depend primarily upon its price.

Popular Knowledge.

In these days of wireless, Press, and cheap literature, knowledge is one of the very few valuable things that is accessible to rich and poor alike. An example is at hand in the form of a most excellent booklet entitled "Science for the Home Manager," which contains a series of radio talks broadcast during the past winter from the University of Pittsburgh, under the auspices of the Mellon Institute.

The talks were selected with the view of giving a general idea of the recent developments in household economies resulting from the application of the scientific method to domestic problems. Each talk was delivered by a recognised specialist in the particular field which he covers.

Canned Food Facts and Myths.

Also, we have before us another sample of cheap knowledge. It is a sixpenny exposition of nutrition and dietetics by a well-known author. This is not the place to review publications, but this merits mention if for no other reason than that of its wide circulation amongst the general public. We leave criticism to Professor Plimmer, an authority of international reputation, to whose remarks on the author's treatment of vitamins in canned foods we desire to draw special attention.

It is really very extraordinary to find that the old myths about canned foods are still alive. It is also most unfortunate that they are voiced in a book dedicated to the popular reader. One is reminded of the vehemence with which Mr. Belloc attacked Mr. Wells for his treatment of evolution in his "Outline of History," maintaining that debatable *theories* should not be urged when writing for the general public. Obviously, it is very much more important to make quite certain that *facts* presented in such literature are something more than debatable opinions.

Lacquers.

A patent has been taken out by Bohart with the object of preventing discoloration of canned foods. It consists, essentially, in incorporating zinc oxide or phosphate or other insoluble oxides or salts of metals which do not yield coloured sulphides in a baking lacquer.

New Fish Process.

Great interest is being shown in an announcement made by the Biological Board of Canada regarding a new method for the rapid freezing of fish. The following account of this process is taken from a letter dated March 30, 1929, from the Biological Board of Canada, Ottawa:

The process of rapidly freezing fish, so that its original flavour and condition may be retained months afterwards, is quite well known and is not new. The Board, however, has been experimenting with and demonstrating a method of rapidly freezing fillets of haddock in half-pound blocks, placing these in pound cartons and marketing them. The name ice fillets has been given to fish so put up. The characteristics of ice fillets are as follow:

1. They are strictly fresh.
2. They are without waste materials, such as bones and skin.
3. They are of uniform thickness, and of size and shape suitable for cooking, such as frying, without cutting or subdivision of any kind; of standard weight, such as half-pound.
4. They are frozen rapidly in less than twenty minutes, so as to avoid damage through formation of large ice crystals.
5. They are maintained in this frozen condition to the time of cooking, and at sufficiently low temperatures to prevent deterioration.
6. They are sanitarily wrapped in waxed parchment paper, and neatly packaged in one pound cantons.

Frozen Fillets.

The fish are first filleted and then cut into five-inch lengths. These are fed into a machine which presses them into cakes five inches long, three inches wide, and approximately one inch thick. The cake is then wrapped in waxed parchment paper, and frozen in forms of the size of a cake in thin metal envelopes in brine. The temperature of the brine is maintained at zero Fahrenheit by means of ice and salt, or ammonia refrigeration. The brine is kept moving, and the fish are frozen to the centre in about fifteen minutes. The frozen cakes are placed in cartons and stored in a room at about zero temperature. The cakes are maintained in this condition during transportation, and in the retail stores, so that the consumer receives them still frozen.

It may be noted that during January and February of this year the Board marketed several tons of these ice fillets in Toronto as a demonstration to the industry. From the start the demand for these fish was so much in excess of the supply that all advertising measures had to be dropped, and so it became early apparent that there is a big undeveloped market for such a high quality of product as strictly fresh fish in an up-to-date form convenient for handling and cooking. Families who previously have used little or no fish were induced to buy this package regularly. No fish firms have so far attempted to market quick frozen fillets, but the Board is arranging to assist and supervise the installation of quick freezing plants by firms on the Atlantic coast, and to furnish all available information to enable them to produce a saleable article.

Pressure Fermentation.

In Germany, Schuster has confirmed the observation of Windisch that fermentation under pressure leads to increase of size and improvement in appearance of yeast. This observation is of importance in relation to the possibilities of the recovery and utilisation of carbon dioxide.

Marmalade Sugars.

Lippich has recently shown that the amount and composition of the sugars present in marmalade may be calculated from the polarimetric readings and hydrocyanic acid numbers, using an aqueous extract.

Power Economy in the Food Factory

By "KILOWATT"

This article discusses in a practical manner the chief points to be considered in making a selection of a wiring system suitable for the food factory.

PART VI

Wiring Systems.

THROUGHOUT these notes emphasis has been laid on the importance of choice of electrical plant and apparatus. The selection of the wiring system is also a matter that requires very careful consideration, as this is frequently one of the weakest links in the chain. It must be remembered that the first aim of wiring is the safe conveyance and control of energy to and at the points where it may be used for giving light, power, or other service. The arrangements adopted must be efficient, suitable to the surroundings, as accessible as may be, durable, and economical in first cost.

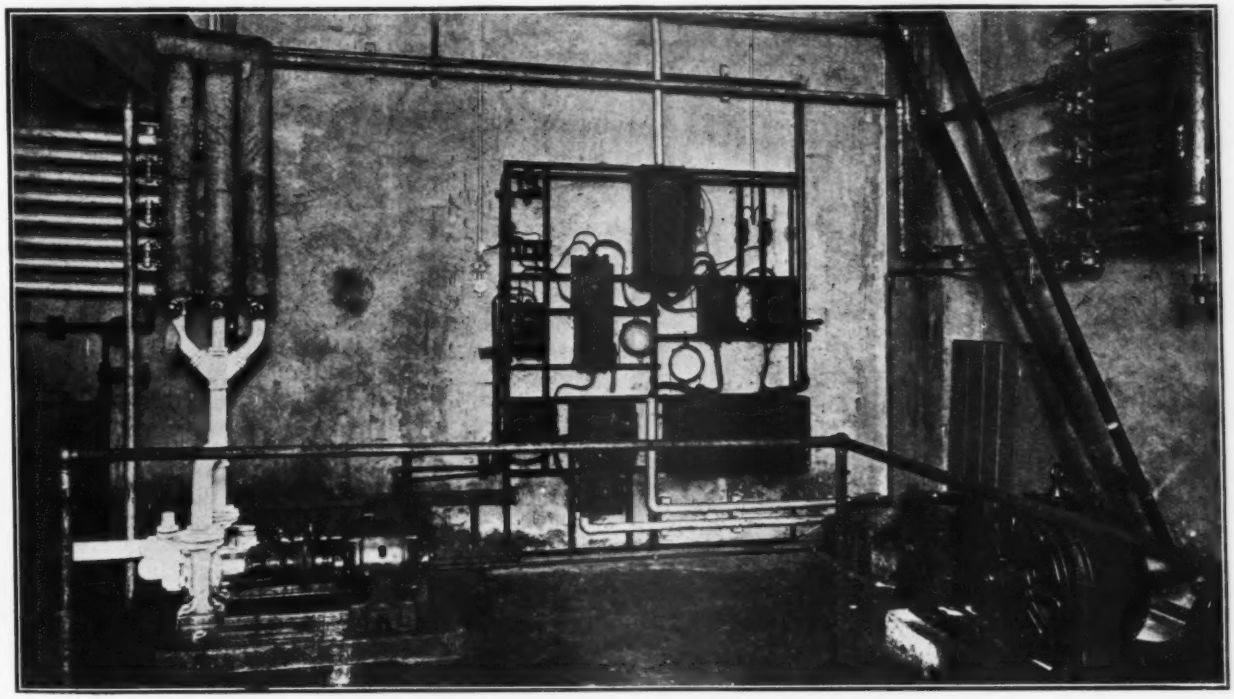
It must be admitted that among the experts there is a good deal of bias for and against the various wiring systems at present in use. There are those who favour steel conduit for practically everything; others are ardent supporters of the C.T.S. (Cable-Tyre-Sheated) system, while many advocate the use of lead-covered cables. It therefore seems advisable to endeavour to give a few practical hints on the systems suitable for use in the food factory, so that one may judge for himself how suited each system may be for the particular situation where the wiring is needed.

The Conduit System.

We will take, first, the conduit system. This consists of erecting a line of light enamelled or galvanised steel tubing along the walls where the cables are to be run. The cables themselves, which are protected with vulcanised insulated rubber, are threaded through the interior of the tubing, which is specially prepared to avoid damage to the insulation. Steel conduits are usually of two kinds—the slip-socket pattern and the screwed pattern. The advantage of the latter over the slip-socket method is that they are electrically continuous and practically waterproof. One of the foremost advantages of conduit wiring is the great mechanical strength afforded, and practical immunity from damage due to moisture, steam, water, or vapour.

Some Disadvantages.

There are, however, certain disadvantages connected with this system which should be brought to the notice of the power user. Unless the greatest care has been taken in the erection of such an installation, it is difficult to prevent moisture condensing in the insides of the conduits, and this, combined with the rust produced, makes an attack on the insulation of



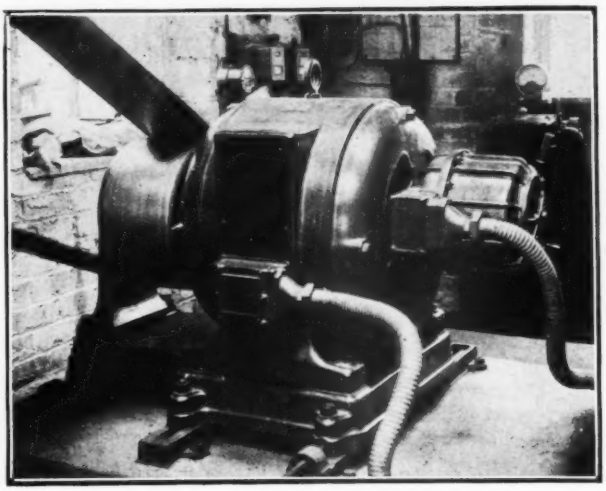
Example of Conduit Wiring running to and from Ironclad Switchboard.

the wires, particularly should they have been damaged through careless pulling into the conduits. The result of this state of affairs is to electrify the conduit itself, which, if not earthed, would be alive, as also any metal articles with which it might come in contact; moreover, individuals touching the tube might get a serious shock.

The regulations of the Institution of Electrical Engineers, as also those of supply authorities and fire insurance companies, demand that the system shall at one or several points be electrically joined to earth. This is usually done by means of a clip which tightly grips the outer surface of the conduit and is connected to a water-pipe or other suitable earth. The earth connecting lead must be of a size equal to at least the largest cable used in the wiring.

It will be seen, therefore, that the erection of a perfect conduit system calls for very great care. If such care is exercised and the best material only used, there is no doubt that the faults mentioned above can be eliminated and a thoroughly sound and reliable wiring system obtained. Thus, those who are willing to pay the higher cost of such an installation will undoubtedly reap the benefit. On the other hand, the question of expense cannot be entirely ignored by all, and for this reason one seeks the alternate cheaper systems.

Bank of Ironclad Switchgear controlling Low Tension and Supply to Local Distribution Boards or to Driven Machines direct.



Flexible Armoured Cable Leads to Motor.

Another system of wiring which is in use is the paper insulated lead-covered cable, which, while being suitable for damp situations, is not entirely proof against varying temperatures, which may cause cracking of the lead. No protection is, of course, afforded against nails, etc., and in this system the earthing regulations mentioned above also apply.

The C.T.S. System.

We now come to what is known as the C.T.S. system, which consists of insulating the wires with vulcanised india-rubber, sheathed over with a very thick covering of tough rubber compound, or cab-tyre sheathing, so named on account of its likeness in strength and durability to the rubber used for cab tyres, which, of course, have to stand exceptionally hard wear and tear. Considerable claims are made as to its ability to withstand the action of steam, water, heat, chemicals, and, in fact, any situations exposed to conditions beyond the normal. The wires can be walked on, bent, twisted, or subjected to pressure without the slightest effect.

Recent years have seen an extensive increased use of the C.T.S. cable, and undoubtedly one of the principal reasons for this is its simplicity, it being absolutely self-contained, no casing, tubing, elbows, or bends being required. With this system, no earthing or bonding is called for, and it may be run on the surface, or, if desired, can be painted or papered over and even buried in plaster without further protection. C.T.S. cabling has been successfully used under most adverse conditions, and from the point of view of economy it is cheaper than many other systems. It is not to be assumed that this system of wiring is absolutely perfect, for, like all other systems, certain drawbacks are present. One feature about these cables which may present a slight difficulty is the advisability of employing men who are trained in C.T.S. work, as the installation of this particular system calls for special knowledge. Summarising the above remarks, screwed steel conduits or C.T.S. wiring will be found suitable for use in food factories.

Necessary Precautions.

It follows, of course, in order to meet the prevailing conditions in a factory that special fittings, such as junction-boxes, distribution boards, switches, and lampholders must be employed in conjunction with either of the wiring systems mentioned above, and the use of the watertight iron-clad pattern is recommended.

After the cables have been erected it is a wise precaution to test the insulation resistance, as the supply authority may refuse to connect up to their mains if found below the requisite standard. Even where the factory generates its own electrical energy, it is in the owner's interest to satisfy himself that there is no appreciable leakage, which means waste and danger.

The question as to what size wire or cable is necessary is one which should be left to the contractors carrying out the installation, as it is quite easy to go astray in these matters. For example, it by no means follows that the larger the motor installed the thicker and heavier must be the cable. This depends on the pressure or voltage of the current, and it may happen that the motor in question is designed to run from a high-voltage supply, which means a cable smaller than another less powerful motor designed to work off a low voltage. The carrying capacity is determined by the amperes it has to deal with, and it is therefore the amperes (not volts or watts) that decide the size of the copper in a cable, while the volts settle the nature and thickness of its insulation. Expert knowledge on this subject is often the means of effecting considerable economies in the ultimate cost of distribution.

The technical requirements of electrical installations are well provided for in the rules and regulations prepared and issued by the Institution of Electrical Engineers. These rules have been accepted by most of the insurance companies, and it behoves the factory owner to stipulate that the installation work is carried out in accordance both with Home Office Regulations and the I.E.E. Rules.

Lecithin and the Aroma of Butter and Margarine*

By BRUNO REWALD

A note on the classification of lipids is given in the Editorial.

WHEN ONE considers the tests that have been made to ascertain the amount of lipoid (phosphoric fatty compounds) in butter, it is striking how small are the quantities given in literature on the subject, particularly since the amount of lecithin and phosphatides (lipoids) in milk is said to be relatively high. In the latter connection it is unnecessary to mention more than a couple of instances occurring in the extensive literature that exists, but a few quotations will help towards a better understanding of the subject. According to Stocklasa, cows' milk contains between 0·09 and 0·11 per cent. of organic phosphorus, corresponding to a phosphatide content of over 2 per cent. Nerking and Hansel (*Bioch. Zeitschr.*, 13, 348) have ascertained 0·0639 per cent. of phosphorus in cows' milk, which, it is true, gives a somewhat lower percentage of phosphatide, though still over 1 per cent. Other kinds of milk, such as sheep's milk and pigs' milk had still more lipoid, whilst, it is interesting to note, human milk shows a lesser content than cows' milk. Vagler (*Bioch. Zeitschr.*, 17, 210) confirmed these figures fairly exactly, and found that with a fat content of 3·4 per cent. in milk, lipoid phosphorus was present to the extent of 0·0522 per cent., representing some 1·2 per cent. lipoid (lecithin).

Now, if the total lipoid in milk be so large, it is curious that the amounts formerly ascertained in butter were so small; such literature as exists on the subject shows the percentage of phosphatide to be only from 0·01 to 0·02 per cent. As a matter of fact, it was only to be expected from the first that phosphatide, which is of a fatty nature, must go into the butter after the process of skimming. Yet former analyses undertaken by Bordas and Raczkowski (*Zeitschr. f. Unters. d. Nahrimgs-und Genussmittel*, 1903, 594-598) showed only 30 per cent. of the phosphatide as going into the butter, the rest remaining in the skim milk in colloidal form. Similar results were obtained by Koch (*Zeitschr. f. physiolog. Chemie*, 47, 327).

It will be seen that the position was to some extent confused, and so fresh attempts were made to solve the problem in recent experiments, both with butter and with milk. These tests were of far-reaching significance, as it has long been known that the lipoid matter is useful in the manufacture of margarine, not only as a means of mechanical improvement—*e.g.*, for colouring or in the foaming or frothing when heating—but also because the smell and aroma of the product are, in particular, influenced when the lipoid is used in a special manner. Here one might mention the specification of an early patent of Josef Müller (*D.R.P.*, 221, 698), in which it is shown in detail that the butter aroma is produced during the spontaneous acidification of the cream through the disintegration of the lipoid. It is further pointed out that palm kernel cake and coconut cake are distinguished by their very high lipoid content, which after being absorbed as food (by cattle) become incorporated in the milk, butter made from which possesses an unusually good aroma. The question may be left as to whether a simple storing of the lipoid is possible in milk;† what does seem likely is that the lecithin in the milk, and hence in

* Reprint from the *Margarine-Industrie*, 1928, No. 24.

† It has been proved by accurate tests that even when large quantities of lipoid are incorporated in food, they undergo disintegration in the body to the extent of over 90 per cent. during the first stages of digestion, and that the greater part of fats will normally be assimilated into the circulation.

the butter fat, exercises a decisive influence on the aroma, especially when one considers that in this respect butter occupies an exceptional position among fats. It would, therefore, appear correct when the patent specification mentioned goes on to say that an aroma similar to that of butter can be obtained with the help of lecithin in the following manner: One litre of fresh sweet cream is divided into four equal parts of 250 grms. each. To two of these portions is added 6 grms. of lecithin obtained from leguminous plants, and not too finely mixed. All four portions are then left to acidify spontaneously at a temperature of from 12° to 15° C. After twenty-four hours, the two portions to which lecithin has been added will possess a much stronger and more intense butter aroma than the others. Thus this peculiar butter aroma is conditioned simply and solely by the presence of the lecithin.

Recent Tests.

These details, however, possess what is possibly an even more interesting feature. Certain very exact tests recently undertaken show that the results formerly determined as to the lecithin content of butter were not accurate. Probably the earlier methods used were unsatisfactory or else too small quantities may have been involved, which may well be the explanation, since the absolute figures are so small that the slightest deviation would mean a large margin of error. If, for instance, only 1 grm. of initial material were taken and the lecithin content amounted to 2 per cent., this would leave only 0·02 grm. to be determined. As to the details of the methods used, nothing more will be said (this is fully gone into elsewhere) except to mention that in tests made of three kinds of butter—one of which was specially made, the second a Holstein quality butter, and the third Danish—quantities of lipoid were ascertained which varied between 1·2 and 1·6 per cent.; so that here we have to deal with quite different figures than formerly. Butter fat from self-manufactured butter, obtained by ether extraction from full milk, showed a still higher amount, which points to the fact that the earlier observations (that in the ordinary process of churning not all the lipoid goes into the fat) are now confirmed. It should be borne in mind, however, that this refers to pure butter, and not to the usual kind which contains water. In order, then, to convert these figures into terms of the latter, some 15 to 20 per cent. must be taken from the figures given. Even so, the value in lipoid remains surprisingly high. The butter in every case was summer butter, and probably also from pasture-fed cows, and it now remains to be seen what results winter butter will give.

Lecithin and Aroma.

The special consistency of butter and its peculiarly pleasant aroma would seem, in view of these tests, to be in direct relation to its particularly high lipoid content, and the old observations of Josef Müller, made in 1908, take on a new significance.

Already, in many cases, lecithin and a special plant lecithin obtained from the soya bean are being largely used in the manufacture of margarine, although probably less from a desire to improve the aroma than for more purely physical reasons. It might be well worth while to watch carefully for any new tests, especially as to-day plant lipoid is so easily obtained. If the results now given should be confirmed, it seems likely that points of greater importance will be raised than hitherto in this question.

Young Chemists in Clover

IT IS usually accepted as an axiom that the chemist's lot is not a happy one; he is always being faced with difficulties and his main object in life appears to be getting people out of the troubles into which they have fallen. But there are occasions when his lines fall in pleasant places and life appears to be almost worth living.

During the course of lectures on Medical Jurisprudence given by one of our most celebrated experts on poisons and the like, the question was raised as to the possible evil effects that may arise from the largely increased consumption of sweetmeats of all kinds that are sold to the public wrapped in various types of metal foil. It chanced that the lecturer had not given this matter his personal attention, and he therefore announced that he would have an investigation made and the result communicated to his audience.

He issued instructions to two of his junior assistants to procure sufficient quantities of "sweets" of all qualities that are wrapped in foils and make a thorough examination.

It is needless to say that the young men entered upon their task with alacrity and carried it out to the letter. Foil-wrapped confectionery of practically every known type was purchased; the lab. soon resembled a sweetie shop. The foils were removed and subjected to a complete analysis; then the outer layer of the contents was carefully scraped off, and this in turn carefully examined for the presence of the metals that had been found in their respective coverings.

In every case the results were entirely reassuring; in no sample was any metallic contamination discovered, even when tests were made after exposure to sunlight and heat, such as might be met with in shop windows. It was thus possible for the lecturer to assure the inquirer that all fears of danger to the public from that source were groundless.

There was, however, another aspect of the investigation apparent only to the laboratory staff who had carried it out—this was the disposal of the unwanted portions of the test materials.

It is, perhaps, unnecessary to state that this difficulty did not give those young chemists many sleepless nights; indeed, their only regret was that there were not more of such pleasant investigations to be undertaken.

Chemistry and the Canning Industry*

By W. D. BIGELOW,
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The following article summarises the advances which have been made in the technique of American canning.

CHEMISTRY and bacteriology go hand in hand in the service they perform for the canning industry. They are used together in the examination of samples to determine the cause of spoilage or to ascertain the reason for any abnormality in appearance or flavour. For the purpose of the present discussion, examples have been chosen from the series of studies carried on during the past ten years, which have added much to our knowledge of the fundamental principles of processing.

Canned foods are simply cooked foods. They are essentially the same in composition and nutritive value as foods freshly cooked from the raw product in the kitchen.[66]† In the study of their composition and nutritive value, canned foods do not offer unique problems. The methods used with foods prepared by other methods are, of course, available.

Some years ago it was assumed that the vitamin content of foods was destroyed or at least greatly reduced by the canning operation and perhaps by subsequent storage. This has been found to be untrue.[61,63,64,65,76] Extensive studies have been made of the influence of canning on vitamins A, B, and C. It has been found that vitamins A and B are not affected appreciably by the canning operation and that vitamin C is generally destroyed to a less extent in canning than in cooking the raw product in an open receptacle, as is ordinarily done in the kitchen. This is because vitamin C is destroyed by oxygen rather than by heat, and canned foods are processed (sterilised) after the can is sealed. Even when the canned product is heated for the table it contains no oxygen in solution and the amount of vitamin C destroyed is inappreciable. After the product is canned the vitamin content appears to remain unchanged during storage, and there is not the diminution in vitamin C which occurs in raw products during storage through the action of atmospheric oxygen.

In the canning of foods, sugar or salt or both sugar and salt are frequently added for flavouring, and water is used either to secure the desired consistency or to fill interstices within the can. The water, sugar, and salt used require the attention of the chemist for somewhat different reasons than apply to other food industries.

Sugar must be practically free from sulphur dioxide. Even small amounts of that substance tend to accelerate the corrosion of the inside of the can with certain fruits. Also, in the processing of fruits, any sulphur dioxide that may be present is reduced to hydrogen sulphide and forms a tarnish of tin sulphide on the inner surface of the can, sometimes discolouring the product. Such a tarnish is normal with protein-bearing vegetables, such as peas and corn, but is abnormal with fruits and arouses the suspicion of the consumer. It has also been pointed out very recently that even refined granulated sugar sometimes carries spoilage bacteria.[21] This will be discussed later.

In canning some products, soft water is preferable to hard. An excessive amount of calcium in the water has a toughening effect on peas and shelled beans.[51] With some other products—for example, beets—calcium in the water may combine on the surface of the product with oxalic acid naturally present, and form a white coating, which is undesirable. The composition of the water is also of interest from other standpoints.

When cans of food are submerged in hard water during the sterilising process, an etching or incrustation is sometimes found on the outside of the cans. This at least dulls the lustre of the cans, and sometimes occasions rusting. Water containing an abnormal amount of sodium bicarbonate also etches the outside of the cans. Only highly purified salt should be used. An excessive amount of calcium in the salt is objectionable for the same reasons as in water.

Examination of Canned Foods.

Chemical and bacteriological methods are often important for the examination of canned foods, especially for the purpose of detecting the cause of any abnormality in the product. An abnormal appearance or flavour may be due to the nature of the raw product or to the details of the canning operation.

In the examination of canned foods, attention is first given to the can. The analyst must understand the principles of can making and be thoroughly familiar with the proper construction of the can. Only such knowledge and experience can enable him to determine whether the can is tight. It sometimes happens that the seal is sufficiently tight to exclude bacteria, but loose enough to admit air. In such a case, oxygen accelerates corrosion[9] and may lead to the perforation or swelling of the can, to various forms of discoloration, or to a staleness or other abnormality of flavour.

The appearance of the inside of a can often suggests the nature of the examination that should be made. Black discoloration of the contents due to several causes has been explained—for instance, in a great variety of products, such as corn,[54,59] peas, shrimp, hominy,[69] beets,[80] and sweet potatoes.[70] This is usually due to sulphide of iron or copper, or to

* Reprint from *Industrial and Engineering Chemistry*, December, 1928.

† Numbers in text refer to the selected references at the end of the article.

a combination of iron with polyphenol. A yellowish or brownish colour sometimes results from excessive sterilisation or too high a temperature of storage. Swelling of a can may be due to bacterial decomposition, to hydrogen resulting from the action of the contents on the tinplate of the can, or, in syrups, to a form of chemical decomposition known as frothy fermentation (Schaumgärung).

Processing Studies.

During the last dozen years much has been added to our knowledge of the fundamental principles of processing, and this knowledge has been applied in a practical way to the manufacture of canned foods. Much information has been accumulated on the heat penetration of canned foods,[17,18,20] and study has also been made of the heat resistance of those bacteria which are hardest to kill in processing and which are ordinarily known in the industry as spoilage bacteria.[22,27,28,29]

Attention has also been given to the hydrogen-ion concentration of foods, both before and after canning,[52] and the profound influence it has on the process necessary for sterilising various kinds of foods. The pH value of fruits, for instance, is usually between 3 and 4 and that of tomatoes about 4·3. This acidity is too great to support the life of spore-bearing bacteria, and, therefore, it is only necessary in these products to destroy the vegetative form. Vegetables have a higher pH value, and in processing them it is necessary to kill the spores. Some of these spores are very resistant to heat.[19,22,23] These resistant spore-bearing bacteria have been classified and their heat resistance has been determined. Considerable work has also been done in bacteriological field surveys in which the sources of these spoilage bacteria have been studied.[24] Sugar has been found to be the chief source. Even the refined granulated sugar used in the industry may carry the spores of these spoilage bacteria. They are present in small numbers, and during the last two years an extensive study has been made of the conditions in canning plants which may lead to the multiplication of these bacteria to such an extent that they become a factor in processing. In the bacteriological field survey mentioned above, it has been possible to determine whether the canneries visited afforded conditions that would permit this multiplication of the spoilage bacteria. Where such conditions were found remedies were readily suggested. More important than this, the field survey established certain principles which must be observed to prevent such multiplication of bacteria. For instance, wooden tanks when used for syrups and brines are sometimes sufficiently porous to harbour bacteria within the wood. This observation has led to the suggestion that hard surfaced tanks be used in place of those made of wood.

Tinplate.

Tinplate is one of the major subjects with which chemists of the canning industry and allied industries have been concerned during recent years. When the work was begun it was hoped that a plate might be manufactured which would withstand the action of canned foods of all kinds for a sufficient time to satisfy the demands of commerce. It was hoped that a weight of tin coating might be found which would protect the steel base so well, or that the steel base itself might be made of such a composition or in such a manner, that the service value of tinplate in packers' cans might be greatly increased.[15,16] This has not been found to be the case, but the study given to the subject has added much to our knowledge.

It was formerly assumed from the relative position of tin and iron in the electrochemical series that iron was anodic in the tin-iron couple of tinplate. This, it was assumed, was the fundamental cause of perforations in canned fruits. Contrary to our expectation, it has been shown that with canned fruits the tin is anodic to the iron of the tin can.[13,14] Data now available lead to the conclusion that if this were not the case the tin can would not be a suitable container for most of our canned fruits.

In order to have a clear understanding of the action of the various fruits on the can, it should be noted that coloured fruits whose colours are anthocyan pigments—that is, cherries and berries—are packed in enamelled cans in order to prevent bleaching. It has been pointed out that the anthocyan pigments are effective depolarisers.[10] Fruits in plain cans give no serious difficulties as a result of corrosion. What corrosion there is is distributed fairly uniformly over the entire inner surface of the can. In enamelled cans, the corrosion which results is largely confined to relatively small areas where the plate has been subjected to the greatest strain in forming the can[11]—that is, in the double seam at the end of the can and along the side seam.

In a plain can the large anodic area of tin affords effective protection for the iron, while the small area of cathodic iron has little effect upon tin corrosion. In an enamelled can, however, the relative area of the exposed iron has been enormously increased because of the numerous breaks in both the enamel and tin coatings at points where the metal has been subjected to strain. Although the fruit acids have little effect in corroding tin, the combined action of the acids and the fruit colours which act as depolarisers has a considerable corrosive effect on the tin. Moreover, the relatively greater area of cathodic iron of an enamelled can likewise effects a corrosive action on the tin anode. The result is that within relatively short periods there may be more iron than tin exposed in an enamelled can.[12,13] The iron, having thus lost the protective effect of anodic tin, is able to set up local couples which result in hydrogen formation and eventually perforations.

Various factors contribute toward rendering the tin anodic to iron in canned fruits.[12] The tin as it corrodes is to a large extent again reprecipitated by the fruit constituents. In berries the tin is largely adsorbed by the seeds.[8] The pulp of the fruit likewise tends to precipitate the tin in the absence of seeds. In this manner the concentration of stannous ions is maintained at a relatively low figure and the potential of tin is materially affected.[2,12,18]

It has been shown that the single potential of tin is affected by hydrogen-ion concentration to the

extent that although tin may be cathodic to iron in very weak acid solutions, at a higher hydrogen-ion concentration the conditions are reversed and the tin becomes anodic. In accordance with this, it is the general experience in the industry that difficulties from corrosion are frequently the greatest with the less acid fruits.[12]

Tin has an inhibiting effect on the iron corrosion in addition to its anodic relationship. Tin in solution, even though in extremely small concentrations, such as a few parts per million, has a very marked effect in inhibiting iron corrosion. It has been shown that such small amounts of tin enormously increased the overvoltage on iron, and it is believed that the protective action of soluble tin is due to this effect.[12]

As already stated, the most serious corrosion takes place in the double seam at the junction of the body and end of the can. At this point there is a relatively deep and narrow channel. Diffusion into the bottom of this channel is naturally limited. Since the available depolarising agents, such as the anthocyan pigments, are proportionately less than the available acid, the pigments in the bottom of this channel are exhausted first. This permits of the formation of a concentration cell, with the bottom of the channel as anode and the top of the channel as a cathode, which is continually supplied by depolarising agents present in the fruits. This mechanism of the corrosion, already described,[7] is probably a material factor in augmenting corrosion at the seam.

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Genesis of Vitamins in Fish

(*Extract from "The Utilisation of Fish By-Products" Pamphlet, pp. 9-10, Canadian Department of Fisheries, Ottawa*, 1928.)

(*a*) The sun is the primary visible source of energy.

(*b*) Only at shallow depths to which rays penetrate —*e.g.*, the "banks," at mixing points where conditions allow the upper layers of water to be replenished with the salts necessary to plant life, parts of the North Sea, and the coasts of Newfoundland—can marine algæ—*i.e.*, diatoms or microscopic vegetable organisms with siliceous coverings—synthesise the vitamin.

(*c*) These diatoms are the food of minute but larger creatures (copebods, amphipods, larvæ, decapods, mollusca, etc.).

(*d*) These in their turn are the food of many varieties of small fish and other marine creatures (caplin, squid, salpæ, and certain molluscs).

(*e*) These are the food of the cod.

(*f*) Cod is a food of man.

In view of the small demand in Canada for cod and other roes, it should be noted that vitamin is not confined to the liver, but, in the period preceding spawning, is found considerably concentrated in the roe, both hard and soft (*British Medical Research Council Report*, No. 38, 1924, p. 29).

Those interested in the medical cod-liver oil industry of Nova Scotia have to ascertain whether the livers of the cod used as the raw material meet certain conditions, and whether a supply of such livers can be obtained large enough to support an important industry. The great increase in the amount of medicinal cod-liver oil produced in Nova Scotia in the past few years is certainly an indication that this natural resource had not been utilised to the full, nor is it yet.

The demand for cod-liver oil has never slackened, and, considering the increasing use in animal feed (for cattle, horses, sheep, and poultry), will increase even if science presents the public with a more tempting substitute. At the present time it is most unlikely that any equally potent edible substance can be produced in quantity large enough to take the place of medicinal cod-liver oil, but it may be noted that the Medical Research Council has reported (1927) that the liver fat of salmon and halibut may be a hundred times as rich in the growth promoting vitamin A as standard medicinal cod-liver oil; again, that the Biological Board of Canada has stated that dog-fish liver oil is even more potent in vitamin A than cod liver, and, further, that professors of science declare that the anti-rachitic vitamin (by some termed D, but not yet definitely differentiated from vitamin A) is formed by the exposure of fat-like substances to ultra-violet rays, and that ·0002 milligrams of a compound named "irradiated orgasterol," fed daily for a period, has a like healthy effect on animal bone growth. Even if, as stated, the liver fat of calves, cows, etc., yields a tasteless oil quite as rich or richer in vitamin A than cod liver, the cost of the supply and the limited amount would bar it from competition.

The Microscopy and Chemistry of Milk

By JAMES SCOTT, F.R.S.A.

Albumen, Nuclein, the Minerals, Souring, Casein and the Identification of Bacilli. The conclusion of an interesting survey.

PART II.

Albumen.

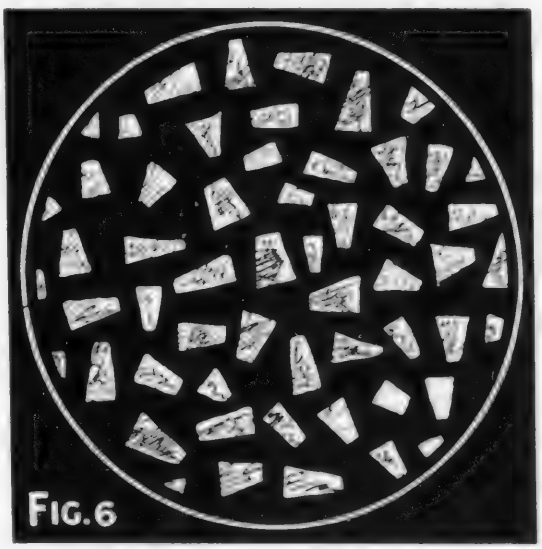
SERUM-ALBUMEN similar to that contained in cow's and other mammalian blood, is another valuable constituent of milk.

Albumen, ***as such***, is not precipitated in milk by either acetic acid, phosphoric acid, tartaric acid, or carbonic acid; neither will *dilute* mineral acids have this effect, although the use of very strong ones will occasion a turbidity in the milk to which they are added, indicative of the separation of impure casein or alkali-albuminate.

Pure milk albumen can be obtained by adding solution of basic lead acetate—*i.e.*, sugar of lead—to the food fluid and then passing a stream of carbon-dioxide through the mixture, thereby producing lead carbonate, which can be filtered off. Upon subsequently running some hydrogen sulphide through the milk, *all* traces of lead are removed, leaving the albumen free, but still in solution. It can, however, be precipated by adding some acetic acid to the milk, and then heating and evaporating the excess solution.

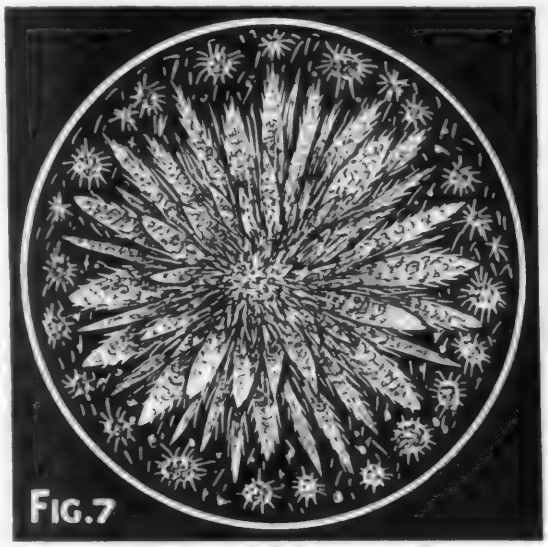
Pure albumen can also be obtained by the process known as dialysis; but we must leave this subject by stating that it can be thus secured as a yellowish, brittle, flaky substance, devoid of taste and odour, soluble in caustic soda and potash.

The amount of albumen in milk is fairly constant, and is usually about 0·4 per cent. But after a cow has calved it may rise as high as 3 per cent. Simultaneously the casein content also increases.



A sprinkling of Milk Sugar (Lactose) after it has been separated.

To the naked eye it appears as a fine-grained, chalk-white powder.



A Solution of Lactose spread out on Glass to dry by Evaporation.

Minute white spots like the above appear. Original size equal one twenty-fourth inch.

Nuclein.

Nuclein is an organo-phosphorus compound, containing 9 per cent. of the latter element. It is also found in egg yolk, yeast, liver sap, and mammalian blood generally. When quite fresh it is a white, amorphous, solid substance, soluble in solutions of soda-phosphate, potash-phosphate, and ammonia-phosphate. It does not (as other albuminoids do) turn violet when it is in contact with Millon's reagent.

The characteristic odour, or aroma, of milk is believed to be due to the presence of a peculiar principle which can be separated by stirring the milk with three or four times its volume of ether. But the test is a difficult one, to be dealt with by the most advanced chemists.

Milk Fat.

The fat of milk is, of course, *par excellence*, its chief feature. It consists of the glycerides of oleic, palmitic, and stearic acids, which, when separated from their glycerine, or glycerol, associates, are white waxes in regard to the second and third items, and an oil in the first. These substances are worth more attention than is given to them here, since they

comprise the chief constituents of butter, prepared from cream either after the milk has been skimmed or centrifugally separated.

It ought to be pointed out that the softness, or mellowness, of both cream and butter are due to the olein, primarily, the stiffening agents being palmitin and stearin. But they are all so well combined or blended in ordinary butter that this fact is unnoticeable. But in very hot water, when the "*grease melts*," they are largely disconnected, and then, when cooling supervenes, present a fairly gritty texture on account of their scattered particles not properly becoming re-compounded with the olein, which simply envelops them. It will show the complexity of milk when I state that the following substances occur in it: butylin, caprin, caprylin, and rutylin—the glycerides of the acids bearing the same names respectively. It is a very difficult matter to separate them from the milk.

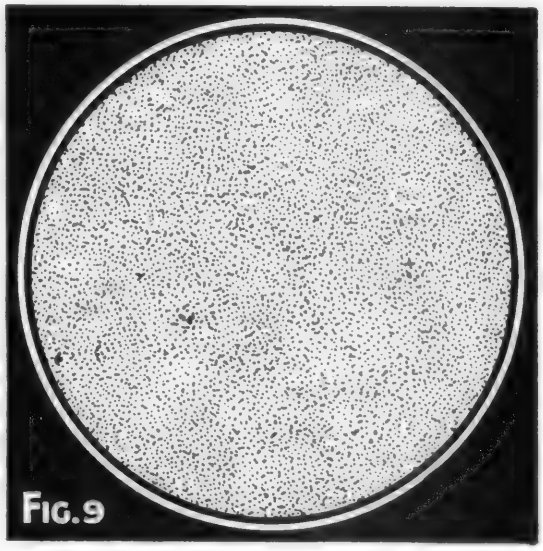
The Minerals in Milk.

There is a very elaborate mixture of minerals in milk, the following approximate list indicating their varieties: potassium oxide, sodium oxide, calcium oxide, ferric oxide, magnesium oxide, phosphorus pentoxide, and chlorine. This is a typical analysis, most of the percentages being moderately high, except that of iron, which is, as oxide, only about 0·06 on the average. These minerals are customarily recognised from the ash of evaporated, and dried, and then *calcined* milk. In the milk itself they are in such intimate combination with one another that no one—not even the most capable analysts—can state their exact natures. They would be present as chlorides, phosphates, carbonates, and so on.

Lactose and Acidity.

It is upon the milk-sugar, or lactose, compound that the acidity, or souring, depends. Milk contains,

One Twenty-fourth Inch of a Film of Aqueous Lactose (Milk Sugar) Solution after being Heated prior to Cooling in the ordinary way by Exposure.



A Multitude of Lactic Acid producing Bacilli, shown Magnified in a Space about One Twenty-fourth Inch in Diameter. (*Bacillus lactici-acidi.*)

usually, about 13 parts to 9 parts of proteid and 2 parts minerals. It is this substance which gives the food its *sweetness*. It is in solution in the whey, after separaiton of the curds, or albuminous portions, which are used for the making of cheese. It is obvious that buttermilk contains it. When it is wholly separated from the milk and refined it exists as a floury, gritty, opaque, *chalk-white* powder, wholly composed of wedge-shaped crystals of the kind shown in Fig. 6. It is thus quite distinct from other forms of sugar. After it has been dissolved in water, preferably hot, and a film of the syrup is spread out to dry, it eventually crystallises, as shown in Fig. 7. These figurings appear, to the naked eye, as scattered white specks which increase in number until the whole field of view is full of them and they lose their definite shapes by overcrowding.

If the syrup-film is heated before it has had time to evaporate in the manner productive of the former crystal-figures, and is *then* cooled, it yields flaky, very peculiarly lined, patterns of the kind shown in Fig. 8. But all these varied structural or physical modifications are characteristic *only* of milk-sugar, or lactose.

The Identification of Bacilli.

Seeing that it is this sugar, while in solution in the milk, which is converted by bacilli into lactic acid, and thence to butyric and other acids, it will not be inappropriate to say a little about these germs.

All the rod-like bacilli (and bacteria) which operate in milk and other foods are very similar to one another, and cannot, as a rule, be identified by their shapes alone; they have to be tested for distinction in culture media. In Fig. 9 is shown the appearance of the bacilli of milk on the same scale of magnification as the other objects illustrated. They have been analine-dye-stained; otherwise they would be white and undetectable.

In Fig. 10 they are shown more highly magnified. It is by the osmotic reactions of the chemical factors and ferments in themselves and the sweet substances in the milk (under the influence of nitrogen in the proteids) that acid replaces sugar. Their excretions, as it were, decompose the surrounding solutions.

There are other less positive compounds in milk—such as kreatine, for instance—that form an interesting study for those with opportunity and inclination for studying the extraordinarily interesting chemistry of milk.

When casein is contained in either acid or neutral liquids it is coagulable by means of the gastric juice of the digestive glands, or even a watery extract made from the stomach of calves. It is believed that pepsin—an alimentary enzyme or ferment—is the active agent which effects this particular modification of the casein.

Casein, devoid of lime salts, is *not* coagulable by rennet, the active ferment of the calf's stomach, whereas it *is* coagulable by the proper use of acids. Some very interesting experiments along these lines are possible.

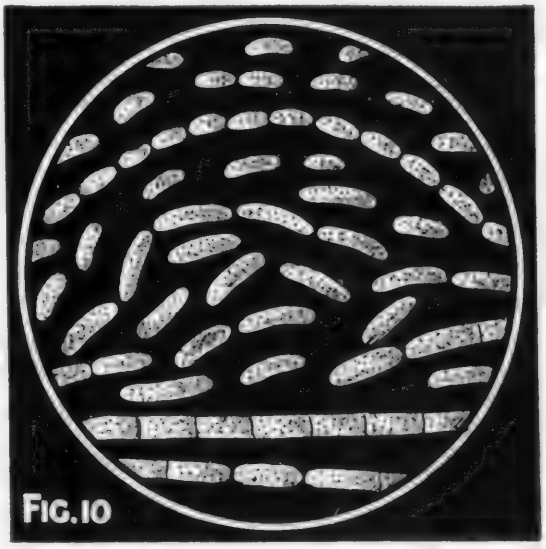
The Chemical Aspect of Casein.

Casein can be precipitated in milk by any of the following substances: lead acetate, copper sulphate, alum, mercuric chloride, magnesia sulphate, and mineral acids, if these are not too much diluted. It needs purifying subsequently, however, as it is contaminated by small percentages of fat, nuclein, lime-phosphate, etc., to the extent of from 1 to 1·5 per cent. of the bulk of the casein.

By far the best precipitant for casein is magnesia sulphate—*i.e.*, Epsom salts—which leaves nearly all the nuclein still in solution. Residues of fat can be removed by ether and filtering of the mass.

Pure casein is a white, brittle, and transparent solid substance which is soluble in dilute acids and alkalis, with which it forms true chemical compounds.

The quantity of casein in milk is usually about 3 per cent., and seldom exceeds 5 per cent. It is also obtainable as a fine, dust-like powder, which is so delicate that the merest puff of breath scatters its particles.



Bacilli.

Each germ divides into halves; a half then enlarging to full size, and itself dividing. By uniting at the ends they produce "threads."

The Utilisation of Oils and Fats in the Foodstuff Industry

By PAUL I. SMITH.

PART II.

THE works practice method is somewhat as follows: A consignment of oil (refined and dry) of about five tons is pumped into a large aluminium deodoriser. This is a complicated apparatus fitted with steam coils at the bottom and connected with a powerful vacuum pump. The oil is heated up to 120° C. by means of superheated steam being passed through the coils. Then the pressure is reduced to about 10 m.m. mercury by means of the pump. Superheated steam is then admitted through a perforated coil at the bottom of the container; the temperature of the oil is then kept constant under 200° C.

The operation is lengthy, and indeed cannot be accomplished in some cases under ten hours.

When the deodorisation has been completed the oil is cooled by passing it through special coolers.

The whole problem of deodorisation lies in getting a low vacuum; leaks always seem to be present in even the finest plants.

There is no hard and fast rule for refining edible oils and fats; indeed, the methods of one refiner may bear no resemblance to those of another, yet they will both turn out marketable products of almost identical purity.

The Accessory Factors.

Vitamins have now become the magic talisman of enterprising advertising agents and writers of pseudo-scientific fiction. It is, however, interesting to know that the importance of these elusive substances has not been overrated, as biochemists and the medical profession are continually emphasising the great dietetic and therapeutic value of vitamin-containing foodstuffs (H. E. Armstrong, *J.R.S.A.*, 1919, 67, 684). Of the five known vitamins, A, D, and E are present in a variety of oils and fats. In describing the many oleaginous materials used in the foodstuff industry, it is essential that a short account of these vitamins or advitants should be given, in order to explain the reasons why certain oils and fats are unsuitable for food purposes, while others are indispensable.

Vitamin A (Growth Promoting).

This is perhaps the best known vitamin and one upon which the most work has been done. The physiologically active principle is present in the unsaponifiable matter extracted from liver oils and also

the roe of cod and other fish, etc. Drummond and Zila found that the fish obtain their supply of vitamin A from marine diatoms and other microscopical sea animalcules.

The growth promoting fraction obtained from cod-liver oil is a yellow, crystalline waxy product representing 1 per cent. of the original oil. It is quite stable, and will stand fairly high temperatures providing oxidising agents are not present. Thus Clarice M. Dugdale and S. R. J. Munro (*J.S.C.I.*, May 21, 1926) found that vitamin A in preserved meats was unaffected by the heat processes found necessary to sterilise such foods. This vitamin has also been found in soaps, providing normal saponification has been carried out and no side reactions have taken place.

Although an enormous amount of research work has been done in attempts to isolate the "active principle" as a definite chemical entity, the results have been only partly satisfactory. On analysis, the unsaponifiable matter from fish oils reveals the presence of complex higher alcohols, such as selachyl alcohol, oleyl alcohol, batyl alcohol, and cholesterol. It is impossible to be dogmatic and say that one of these is "vitamin A." Professor J. C. Drummond, a well-known authority on vitamins, says: "The idea that vitamin A might be an unsaturated alcohol of this type is not unattractive." The now well-known colour reactions to detect and estimate the vitamin in foodstuffs are based upon the above assumption.

The mechanism of vitamin action is quite obscure, but sufficient is known to enable one to define it as catalytic. Thus it may be compared with finely divided platinum in the synthesis of water, by exploding a mixture of hydrogen and oxygen. Briefly, it may be said that a catalyst is a substance which, although present in a minute quantity, can "start, accelerate, or retard the speed of chemical reactions." Ostwald compares the action of a catalytic agent with the action of oil on a machine, or a whip on a sluggish horse.

Vitamin D (Anti-rachitic).

Professor J. C. Drummond (*J.S.C.I.*, December 31, 1926) writes: "Almost every conceivable type of causative agent has at one time or another been blamed for the onset of rickets. Etiology can be divided into two main groups. Of these, one consisted of a variety of views, all of which held that in some manner or another defective diet was responsible for the trouble, whilst the other type of theory was based on the belief that faulty hygienic surroundings, in particular lack of fresh air and sunshine, were the main causative agents."

Although Huldschinsky, in 1916, proved that children suffering from rickets could be cured by exposure to a battery of a quartz-mercury vapour lamp (rays in the vicinity of =300 u u.), it was left to Dr. Harriette Chick, in Vienna, and Steenbock, in America, to reconcile the two theories. The former investigator found that rickets in children could be cured by exposure to ultra-violet light or administration of cod-liver oil, etc.

The latter scientist performed a series of diet experiments. Thus he produced rickets in rats by feeding them with a synthetic diet deficient in certain essential ingredients. Then, by exposing this food to the rays of the quartz-mercury vapour lamp, he found that rickets could be prevented.

It is now an established fact that rickets can be cured by exposing the child's skin to sunlight, in which case the vitamin is produced in the skin by a photochemical reaction, or by administering cod-liver oil and other substances in which the essential advitant, or vitamin D is present.

Dr. O. Rosenheim (*Biochem. Journ.*, 1342, 1926) has now identified ergosterol as the precursor of vitamin D. Irradiated ergosterol possesses remarkable anti-rachitic activity. Rosenheim says that 1/10,000 to 1/20,000 mgm. per diem prevents rickets in rats, and that clinical experience has shown that human rickets can be rapidly cured by daily doses of 2 to 4 mgm. Recent work of Morton, Heilbron, and Kamm has shown that vitamin D produced in this way is identical with that produced in the skin by irradiation.

Vitamin E.

Very little is known about this important advitant. It was discovered by Professor H. E. Evans, of Berkeley University, California, who found that while young rats could grow to maturity on a diet of proteins, carbohydrates, salts, etc., together with the essential vitamins, A, B, C, and D, they did not reproduce at a normal rate. On supplementing the diet with other foods reproduction proceeded on the usual lines. Later Professor Evans isolated the "Physiologically active substance" from the oil extracted from the germ or embryo of wheat. It is very stable, and, in fact, Evans and Burr class it as the most stable of the vitamins, as it can be fractionally distilled from the unsaponifiable fraction of the oil at a temperature of 180° C.

Professor Drummond gives the following figures, illustrative of the amounts of vitamins necessary "to satisfy the requirements of animals used in the tests."

Vitamin.	*Rats, Body in Grms.*	*Minimum Dose recorded in Grms.*	*Dose per 100 Grm. Weight.*
A ...	100	0·00001	0·00001
D ...	100	0·0001	0·0001
E ...	200	0·0005	0·00025

The estimation of vitamins is a long and complicated process, if undertaken chemically or biologically. Of especial interest from the biological standpoint is the method of Axel Hojer, of Lund, who determines the anti-scorbutic value of foodstuffs by microscopic examination of the teeth of young guinea pigs. Lack of the anti-scorbutic vitamin produces in the teeth definite pathological changes, which are clearly shown in stained sections, and by studying them the fully protective dose may be definitely arrived at.

Colour tests for estimating vitamic activity are yet in their infancy, but the author is optimistic enough to think they will soon be recognised as authoritative.

(To be concluded.)

a brilliant convention

At the Opening of the New Pea Canning Plant of Messrs. Wisbech Produce Canners Ltd.
Mr. Noel Buxton, the Minister of Agriculture, assuring Sir Edgar Jones (left) and Mr. S. W. Smedley that the new Government will do all it can to help our growing Canning Industry.

THE COMPLETE SUCCESS which attended the convention of the National Food Canning Council held at Cambridge during the last week of June was due, first of all, to the splendid team work shown by those leading spirits in the agricultural, tinplate, packing, and distributive spheres who are building up a prosperous canning industry in Great Britain. Under the leadership of Sir Edgar Jones, the convention moved through its varied programme with a precision that was also a tribute to the work of organisation done by the Council's Hon. Secretary, Mr. H. W. Packer.

The Business Session.

Within a stone's throw of the old tower from which Erasmus spread the spirit of the Renaissance in England, some two hundred delegates discussed problems connected with the industry which may play a large part in our present revival of industry.

Mr. W. B. Chivers, during the discussion on "The Standardisation of Raw Materials for the Canning Industry," opined that whilst the Pershore was an excellent plum for canning, the Victoria was more popular. Mr. H. V. Taylor, Commissioner of Horticulture, Ministry of Agriculture and Fisheries, said that the Victoria plum was the plum *de luxe* for canning purposes, being large and of good colour, which improved in flavour when canned in syrup. Mr. Seabrook, on the other hand, said that it would probably be necessary to popularise other varieties for the purpose, as it was possible that there would be no more Victoria plum-trees left in a few years time, millions dying all over the country from silver leaf disease. Mr. Smedley pointed out that in Worcestershire, Victorias were grafted on egg plum stock and rarely took the silver leaf, and urged that nurserymen should produce Victorias by growing on the right stock, as the public should have what they wanted.

Research Needed.

With regard to vegetables, he went on to say that for canning purposes turnips an inch or so in diameter and beets a little bigger than walnuts were wanted. We had to go abroad for the seed. Mr. Cuthbertson (Royal Horticultural Society) said that research work was required, that we must get in touch with foreign growers, get their samples, and try them out.

Mr. F. Hirst raised the question of the density of syrups to be used in canning, in his paper on Modern Processing Methods in Fruit Canning. The Director of the Campden Research Station was of the opinion that a lighter syrup ought to find favour with English fruit canners, a heavy syrup tending to mask the markedly superior flavour of English grown fruit, and there was also a feeling against sweet foods at the moment, under the impression that such foods were fattening.

Syrup Density.

Mr. G. Salmon thought that it was a matter for the individual canner to prove. He was not of the opinion that a definition could not be laid down with regard to the right syrup to use. Mr. Hirst maintained, however, that if standardisation was to be effective at all they must agree as to what strength of syrup to use.

A member of the public agreed with Mr. Hirst as to producing goods of uniform standard. If the delicious flavour of English fruit was to be used as a factor in selling English canned goods, the public might be educated to appreciate a lighter syrup than the American goods had accustomed them to.

Mr. Hirst, replying to Mr. Salmon, said that fruit canners in this country did not use fourteen pounds of sugar per gallon for strawberries—a great number used ten pounds—which he thought gave a superior flavour. Fruit canned with fourteen pounds was sickly. The Chairman, Sir Edgar Jones, eventually announced that a meeting in the autumn would decide this and other outstanding questions, such as the adoption of the National Mark, possibly with the co-operation of the Ministry of Agriculture.

At Christ's College.

During the lunch given by Messrs. Chivers in the hall of Milton's college, Mr. A. Woodall expressed the opinion that until canners offered growers a definite contract for a number of years, they would not get the fruit they wanted. Under present conditions growers were apt to "hold on" even though they were offered better prices than they would have got were it not for the canners—and sometimes they received chastisement, as in the case with strawberries just now.

It was whilst giving the writer some of Chivers' own grown strawberries that a waiter murmured reassuringly, "They're not canned." Really, the amount of feeling there is against canned foods must be enormous!

C. L. R.

Food Packed in Glass: Application for the Marking of Imported Containers

Well-Known Manufacturers' Evidence

GLASS CONTAINERS of all descriptions for the packing of food products were included among the articles for which an application was made for a Marking Order under the Merchandise Marks Act, 1926, the hearing of which was opened at the Board of Trade on April 29, 1929.

The application was made by the Glass Manufacturers' Federation, the British Flint Manufacturers' Association, and the Northern Association of Pressed Glass Manufacturers, who were represented by Mr. E. H. Wethered.

Mr. A. S. Comyns Carr, K.C., with Mr. N. L. Macaskie and Mr. Horace Samuel, appeared for the opposition, which included, among others, the Importers of Invalids' Food Manufacturers' Section of the London Chamber of Commerce. Mr. J. W. Morris appeared for the Food Manufacturers' Federation and the Manufacturing Confectioners' Alliance, which also opposed the application. Sir H. Llewellyn Smith presided over the Committee.

The Applicants' Case.

Mr. Wethered, opening the case for the applicants, said that his clients represented 85 per cent. of those engaged in the manufacture of glass bottles and containers in the United Kingdom. The figures supplied by the Board of Trade showed that in 1927 there were 1,672,267 gross of glass bottles imported into this country, representing a value of £949,545. He contended that most glass containers bore no mark of origin, so that it was impossible to tell which were made abroad and which were made in England, while there was an increasing desire on the part of the public to know the origin of the goods they bought.

Mr. Macaskie, for the opponents, said that the cost of marking containers would be a serious addition, and that the public might be led to believe the contents were foreign, or in any case, the sale of the article would be prejudiced.

The Food Manufacturers' Federation.

Mr. J. W. Morris, representing the Food Manufacturers' Federation, said that tongues and brawn were packed in glass moulds, which, for display purposes, were exhibited the reverse side up, so that any marking of the glass mould would in a special degree tend to mislead the public into thinking that the contents were foreign. He also said that difficulty had been experienced in getting glass moulds capable of resisting the heat necessary in the packing of tongues and meats.

Mr. J. P. Shippam, one of the Managing Directors of Messrs. Shippam, Limited, and Chairman of the Meat and Fish Section of the Food Manufacturers' Federation, said that his firm generally used foreign glass containers for tongues and brawn, but for meat they used English containers. Their experience had shown that they got better results with the foreign containers for tongue and brawn than they did with English-made glass, with which there were more breakages, which involved the loss of the contents also. Moreover, with the English glass they did not get the same accuracy of shape, especially in the groove round the top in which the rubber ring fitted. The English glass did not have the heat-resisting qualities possessed by the foreign glass, while at the same time, until recently, it had been more expensive. His firm got their chief supplies from Holland. The container cost 2⅝d. compared with 5s. to 5s. 6d. the value of the contents. When purchasing from abroad, he always knew where they were manufactured. He felt it would undoubtedly prejudice their sales if the container were marked "Foreign."

The Case for English Glass.

Mr. Wethered read extracts from correspondence which had taken place between witness and the Canning Town Glass Works, Limited, in October and November, 1928, in the course of which it was revealed that witness' firm had admitted that half a dozen of the jars supplied as samples by the Canning Town Glass Works to his firm had proved satisfactory. Furthermore, the firm had agreed to the stipulation that if a trial order were given they would make good any losses that might be incurred resulting from the jars supplied.

To Mr. Wethered's questions, witness said that he did not think an experiment with half a dozen jars was sufficient grounds for making a change, and he did not try to follow up the negotiations with the Canning Town Glass Company because of the expense.

Mr. Wethered said that in view of that correspondence he objected to witness coming to the Committee and saying the reason why he bought from abroad was because he could not get the glass in England.

Witness denied that he gained any financial advantage whatsoever from placing the orders in Holland. At two meetings of the members of the Meat and Fish Section of the Food Manufacturers Federation it had been unanimously agreed that English glass did not yet give satisfaction. That was as recently as last year. Mr. A. W. Beach, Managing Director of Messrs. T. W. Beach and Sons, Limited, the fruit preservers in the Vale of Evesham, said that he was an ex-chairman of the Jam Section of the Food Manufacturers' Federation and was speaking on behalf of that section. He said that 95 per cent. of the one-pound and two-pound size containers used were English made, and the English jars had proved quite satisfactory, and their use was likely to continue. On the other hand, the 1½-ounce size jars were

largely foreign, as they were about 20 per cent. cheaper than the English jars, and so great a difference in price was a considerable amount to a manufacturer. Those small containers represented no large proportion of the trade. Last year the value of the export trade in jam was £359,000, and to a large extent represented the use of English glass.

Replying to Mr. Morris, he said it was the view of his section that they desired absolute freedom to buy their jars in whatever market they desired without anything which might tend to restrict their sales.

The Manufacturing Confectioners' Alliance.

Mr. A. H. Pirie, Manager of Thomas Pascall, Limited, Blackfriars Road, S.E., appeared in place of Mr. Pascall to give evidence on behalf of the Manufacturing Confectioners' Alliance, which was concerned with the manufacture of boiled sweets.

He said that his firm were users of a large variety of jars and bottles for sweets, and in such bottles it was necessary to have a clear white type of glass, and many bottles of that description they were unable to obtain in this country at a price as good as they could get on the Continent. The jars made in England were of a terrible colour, so that it was impossible to use them for show purposes. They exported to all countries in the world, and it would be very damaging to their export trade if the word "Foreign" was stamped on their containers.

Replying to questions, Mr. Pirie said his firm had not made any effort to get the jars in this country, but people in a position to sell came to their doors, and, in fact, they were besieged by too many representatives. Witness added that a further difficulty was that ultimately many of the raw materials, such as sugar, were actually of foreign origin, so that they would have to put on "all foreign" if they labelled their goods "foreign."

Mr. Donald Robertson, Assistant Manager of the Canning Town Glass Works, Limited, said that he had investigated a certain allegation as to the softening of glass moulds for brawn and tongue, and such foodstuffs, and it was a difficulty which no longer existed. His firm had now made tests to make sure that their glass moulds were capable of standing the heat which was required by their customers. In the last two years they had no complaints in regard to them.

Virol, Limited, and Bovril, Limited.

Mr. B. S. Straus, J.P., Chairman of Virol, Limited, was called to give evidence for the opposition. He also represented Messrs. Bovril, Limited. He said that without fear of contradiction they were not only the largest consumers of glass containers in the British Empire, but in the whole world. They used millions of containers in a year. The firms he represented felt that a container marked "Foreign" would lead people to believe that the whole was foreign, which would not be true, and would prejudice their sales.

Sir Stanley Machin, a Director of Messrs. Batger and Company, Limited, confectionery manufacturers, and President of the Food Manufacturers' Federation, and also ex-President of the Manufacturing Confectioners' Alliance and an ex-President of the Association of British Chambers of Commerce, opposing the application, said he was appearing for these bodies. The Food Manufacturers' Federation included firms using glass bottles and jars for jams, sweets, meat products, pickles, and similar articles, employing users totalling 150,000 in this country. Out of 680 firms, 445 used glass containers.

Why Foreign Containers are Preferred.

In reply to Mr. Morris, he said that it was their view that to mark a container with the word "Foreign" would inevitably identify the contents with the container. As far as they used foreign glass the reason was sometimes a question of price, but in other instances was because the containers required did not give the requisite service.

Mr. Wethered asked whether it was in his knowledge that many firms were using English containers for packing tongues, and witness replied that he thought not many did. Some did, but not the largest.

Mr. Wethered then produced exhibits of tongues packed by nine firms in containers which he said had been supplied by the Canning Town Glass Company, and in eight cases of which the mark of the company was on the container. Some of those firms Mr. Wethered contended, were among the largest packers in the country. Sir Stanley Machin said that some of them he had no knowledge of, and others were not manufacturers in the ordinary way.

The inquiry was then adjourned.

Trade News

BRITISH Inventions with British Workmanship is the keynote of a new illustrated catalogue issued from Burton-on-Trent by S. Briggs and Company, Limited, who have brought the science of grinding to perfection.

An interesting item is a self-emptying mixer which comprises two conically shaped compartments with two parallel shafts passing from back to front and along the axis of each compartment.

* * *

The problem of transporting raw or manufactured products, both packed and in bulk, resolves itself into the consideration of three things:

1. Safety of contents.
2. The effect on customers.
3. Freight.

Fruit and vegetable canners will find these themes satisfactorily treated in the book now issued by "Uno" Products, from the "Uno" Works, South Norwood, London.

* * *

The *Superintendent* is a beautifully produced monthly journal which is published by the Karl Kiefer Machine Company, who are the largest manufacturers of bottling machinery in the world. It is supplied gratis by C. S. Du Mont from Windsor House, Victoria Street, London, S.W. 1.

At the present time it is more than ever apparent that only the larger concerns can successfully weather the storm of keen competition which exists. The multiplicity of small wholesale firms tends to create a good deal of overlapping, and with heavy overhead charges the margin of profit earned is hardly sufficient to provide an adequate return on the capital involved. Both at home and in the market overseas, the larger concern is able to make such arrangements as place it in a position to cater for all classes of trade. It is a commonplace that a great deal of the heavy business in the present day has to be done for a mere brokerage, considerable outlays being involved and fairly long credit necessitated, and it will be recognised that the big company with its sound financial position will, in the long run, command the major portion of the trade and be able to give the service demanded both by shippers and customers.

* * *

The official intimation that Messrs. Joseph Travers and Sons, Limited, of 119, Cannon Street, London, E.C. 4, have, from June 10, merged the business of Messrs. Game and Son, Limited, of 2 and 4, Eastcheap, London, E.C. 3, into that of their own, is another sign of the times. The House of Travers is one of the oldest in London, and was founded in 1666.

Messrs. Game and Son, Limited, a private company, was formed in 1887 by the late Mr. James Aylward Game, and at first was known as Game, Harrison and Larner. Subsequently the two partners, since deceased, went out of the business and Mr. J. A. Game continued to build up a successful trading concern with his son, Mr. Herbert A. Game, who, since his father's death early this year at the age of eighty-five, has continued as Chairman of the Company. It is interesting that the late Mr. J. A. Game, the founder of the company, commenced his business career with Messrs. Joseph Travers and Sons, and it is rather a coincidence that on the retirement of Mr. Herbert Game, the present merger should have been effected.

* * *

Interesting developments are in progress in connection with the business of Facchino's Purity Biscuit Company, of Bradford Street, Birmingham. The works in Bradford Street, Birmingham, have become inadequate to meet the great demand for Facchino products, and during the past few months negotiations have been taking place for the erection of a new factory.

Considerable difficulty was experienced in choosing a suitable site since it had previously been decided that the factory should be in every way set amidst ideal surroundings, as far as possible away from the smoke and grime of the city. Finally, a site was chosen in what is essentially a country-residential district some little distance beyond the boundary of Greater Birmingham. The ground is a part of the estate of the Earl of Bradford, and is situated at Castle Bromwich, Warwickshire.

The proposed building will front on to one of the main roads leading from the city, and is within easy reach of the industrial centre. Work has already commenced upon the building, and if the plans and drawings are any criterion, this will be a well-planned, light and airy factory, ideally suited to the production of pure food products.

* * *

The discovery of a new vitamin will occasion a mild flutter in the medical world and the journals which express its opinions. A later symptom is the appearance of foods—and sometimes beverages—"rich" in the new accessory factor, but we have seen nothing so remarkable in vitamin preparations as "Plasmona," which, though not yet competitive, is being widely advertised in the medical press. Well substantiated claims are made that it contains:

The anti-infective vitamin factor A due to liver substance; the anti-rachitic vitamin factor D extracted from cod-liver oil, in combination with plant phosphatides; the anti-neuritic vitamin factor B due to yeast; the anti-sterile vitamin factor E due to germinating wheatmeal; the anti-anæmic principle of liver due to liver extract; the lipoids of the central nerve system in an unchanged form—*i.e.*, phosphatides, cerebrosides, cephalin, protagon, etc.; milk protein, the protein of the highest biological value; important mineral substances such as calcium and iron compounds.

Manufacture is at a comparatively low temperature by the use of vacuum plant, in order to retain the therapeutic effects of its concentrated organic and vitamin content.

* * *

The following have consented to act as judges at the exhibition which is to take place this year at the Royal Agricultural Hall, London, from September 7 to 13: Messrs. Ald. H. Warburton, J.P., Bolton (Chairman); H. W. Wickert, London (Vice-Chairman); E. Harding, Birmingham (Arbiter); F. Ashworth, Norwich; H. Bamford, London; E. C. Bell, J.P., Sheffield; J. G. Blackledge, O.B.E., J.P., Liverpool; T. H. Carr, Accrington; W. Clifford, London; E. Coleman, J.P., Margate; W. Collier, J.P., Leigh, Lancs.; B. Fisher, Liverpool; F. G. Hill, Richmond; J. C. M. Kerslake, Brockley; J. H. Merrett, Cardiff; W. H. Palmer, Swansea; B. Pooley, Plymouth; W. H. Pratt, Cambridge; H. A. Sapsford, Highams Park; A. Sargeant, London, and W. H. Wigley, Derby.

* * *

To bring their title more into line with their manufactures and, having obtained the sanction of the Registrar of Joint Stock Companies, the North Acton Machine Tool Company, Limited, will trade as the North Acton Conveyor and Elevator Com pany, Limited.

No change is being made either in the proprietorship or management.

* * *

In view of the growing interest that is being aroused in the canning industry, we feel sure that Messrs. A. Holden and Sons' new book, "Baking Lacquers for Fish and Meat Containers and Closures," will prove of considerable interest to the trade.

Enormous World Trade in Wheat.

INTERNATIONAL wheat prices remained at the lowest level since 1923-24, between the months of December, 1928, and April, 1929, according to a study recently issued by the Food Research Institute of Stanford University, California. The prevailing wide margin between exportable wheat surpluses and import requirements changed only a little. Nevertheless, there were fairly wide fluctuations in prices. An extraordinarily cold winter throughout the Northern Hemisphere seemed likely at the time to have damaged winter wheat sowings, and this situation led to an increase of prices from early January to mid-February. The advance was considerably greater in Chicago and Winnipeg than in Liverpool and Buenos Aires. After mid-February a sharp decline occurred, and continued through the first third of May. It was nearly as great in Liverpool as in Chicago, but was smaller in Winnipeg. The decline seems to have been due not to a change in conditions of demand and supply for the present crop year, but rather to an accumulation of evidence tending to show that winter wheat had not suffered unusual damage from the cold winter. Other factors were important in the decline; the most noteworthy of these was the pressure of extraordinarily heavy stocks in exporting countries. This pressure began to be felt especially when the new Argentine crop began to move in large volume in late February.

High American Stocks.

International trade in wheat and flour was of record volume, as it had been in earlier months. Prevailing low prices encouraged importation and consumption, especially in ex-European countries. These imported much more wheat and flour than ever before. But in spite of the record shipments, the accumulation of stocks in exporting countries remained extraordinarily large. The prices of representative wheats in the United States were relatively too high to permit exportation in a volume consistent with the available supplies, and here the accumulation of stocks in commercial channels was particularly striking.

The volume of world trade for the crop year now seems likely to prove by far the largest in history. Net exports will probably approximate 950 million bushels, a round 100 million bushels more than ever before. Year-end stocks also seem likely to be of record size, with the greatest accumulation in the major exporting countries. Increased wheat consumption for food and feed in 1928-29 seems not to have caught up with increased production.

A New Cannery in Transcaucasia.

We learn that a new conserving factory, costing 450,000 roubles, is to be erected at Kutais, West Georgia.

The Achema, 1930.

The Exhibition of Chemical Science to be held in Frankfurt-am-Main, the centre of the world's chemical industry, next May and June, will be the sixth of a series of these exhibitions which began in Hanover in 1920. It is hoped that even the great success of last year's exhibition at Essen will be eclipsed. The prospectus, which is a revelation, can be obtained from the

Deutsche Gesellschaft für Chemisches Apparatwesen, Seelze bei Hannover, Germany.

"*Achema*" ("*Ausstellung für chemisches Apparatwesen*"), 1930, will be one of the events of the year.

Kenya Sugar.

An up-to-date sugar factory is now being worked at Ramisi, in the coastal region of Kenya Colony, some forty miles from Mombasa on the Gazi-Tanga route, by Ramisi Sugar Estates, Limited (capital £50,000), backed by important Mauritius sugar interests. The chief reason for selecting Ramisi is that in this district cane matures in a remarkably short time: the cane crushed before the eyes of visitors at the opening had been planted only eleven months previously, whereas in up-country districts, and in other parts of the world, cane takes some eighteen months to reach maturity. Ramisi is not the only place on the coast where sugar cane can be produced advantageously, and it is believed that in due time sugar production in the region will be on a large scale.

Fish From Canadian Prairies.

Western Canada is chiefly famous as a great wheat producing and mixed farming country, and comparatively little is known of its commercial fisheries and other natural resources. Last year the three prairie provinces—Manitoba, Saskatchewan, and Alberta—marketed 37,584,000 pounds of fish caught in the numerous fresh water lakes and rivers. Though there is a good local market for fish caught in the Canadian west, there is also a keen demand for it in New York and other cities in the United States. Whitefish is the principal fish caught in Western Canada, with tullibee in second place. Pickerel, pike, and millet are also netted in large quantities.

The New Fish Preserving Process.

The Fisheries Experimental Station of the Biological Board of Canada at Halifax, Nova Scotia, has recently perfected a brine freezing process to such an extent as to make it practicable to ship fresh fish to inland points and market the product in an unquestionably fresh condition.

The new process has been developed on the theory discovered by Sir William Hary, the pioneer colloid chemist, that if the freezing operation is sufficiently rapid the product frozen will always return to its pre-frozen condition. By the new method, developed over a period of four or five years, the frozen fish are reported to retain their fresh ocean flavour as long as they are held at the proper temperature.

The success of the recent experiment in Toronto to test the marketability of the "ice fillets," as they are called, was so convincing that the Biological Board of Canada has urged plants on the Atlantic coast to take up the freezing of fillets.

Haddock was selected for the initial process, because of its name and wide market; mackerel and herring have been treated successfully in other experiments, and sausages, steak, and chops, where not too thick, have also been dealt with successfully. Professor A. G. Huntsman, of the Biological Board, hopes soon to preserve beef as fresh as the day it was slaughtered for a year if necessary, and will then test poultry. Oysters may be handled in the same way as fish, in his opinion.

Those interested in the process are Professor A. G. Huntsman, Biological Building, University of Toronto, Toronto, Ontario, Dr. A. H. Leim, and J. J. Cowie, Department of Marine and Fisheries, Ottawa. The experiments and marketing have been conducted under the care of the Biological Board of Canada, of which these men are members, and the process is said to be free from patent restrictions or monopoly. Dr. Huntsman is preparing a pamphlet on the process.

Soviet Trade.

The total foreign trade of the Union of Socialist Soviet Republics in the fiscal year 1927-1928 (October to September inclusive) showed an adverse balance of 67,000,000 rubles on the pre-war basis, or 161,000,000 rubles on the present value (2s. 2d.) of the ruble, according to statistics published in the Moscow weekly Soviet Trade.

Among the outstanding facts brought out by the figures for 1927-1928 are that over 80 per cent. of both imports and exports pass over the European frontiers; that in imports, under the policy of controlled importation, emphasis is placed on industrial raw material and equipment for manufacture of essential goods; that Germany is again the largest purchaser and seller; that imports from the United States have grown considerably, and that imports from England have decreased markedly.

Totals of Foreign Trade.

The totals of the U.S.S.R. trade over all frontiers in recent years, as compared with the average annual trade during the five years 1909-1913, is represented by the following table, in which for purpose of comparison all values are computed in pre-war rubles:

Year.	Imports. Quantity (Thousands of Metric Tons).	Imports. Value (Millions of Rubles).	Exports. Quantity (Thousands of Metric Tons).	Exports. Value (Millions of Rubles).	Balance. Favourable (+) or Unfavourable (-) (Millions of Rubles).
1909-1913 average	—	1,140	—	1,501	+361
1923-1924 ,,	979	234	6,711	369	+135
1924-1925 ,,	1,864	416	6,169	371	-45
1925-1926 ,,	1,548	465	7,856	480	+15
1926-1927 ,,	1,845	497	9,550	569	+72
1927-1928 ,,	013	668	8,764	601	-67

Diminished Trade with England.

Figures showing the origin and destination of overseas trade show that Russian imports of goods from this country during the last fiscal year were less than half those of the year 1926-1927:

	1926-1927. Exports.	1926-1927. Imports.	1927-1928. Exports.	1927-1928. Imports.
Australia	—	15·6	—	29·0
Austria	3·6	19 7	7·6	16·8
England	197·5	97·1	147·7	45·4
Belgium	13·2	·1	11·2	1·3
Germany	167·3	157·7	185·4	242 0
Netherlands	23·2	4·9	16·6	3·7
Greece	6·8	·4	5·5	·2
Denmark	9·9	·9	11·4	2·0
Egypt	5·9	20·8	9·5	32·6
Italy	37·7	3·2	25·8	9·1
Latvia	57·4	1·6	79·9	5·8
Norway	15·7	3·0	2·4	5·0
Poland	19·5	13·1	14·9	6·9
United States	17·3	143·4	22·1	181·5
Finland	10·5	17·7	7·6	16·5
France	54·1	21·7	40·4	35·3
Czechoslovakia	2·2	10·8	3·7	17·2
Switzerland	6·2	11·8	3·5	15·9
Estonia	6·9	3·6	4·8	2·7
All other countries ..	23·3	76·7	35·8	151·2
Total	678·2	623·8	635·8	820·1

England continues, however, to be a heavy buyer of Soviet products—chiefly lumber and grain—and for several years the trade balance has been against England in this exchange of goods. It is said that the Soviet Union employs the surplus funds from its transactions with England in purchases of American, instead of British, manufacturers. During the three and a half years—October 1, 1924, to March 31, 1928—the credit balance of the Union of Soviet Socialist Republics in trade with England was 600,000,000 rubles, whereas in the same period the debit balance in trade with the United States was 961,000,000 rubles—the figures seeming to bear out this assertion.

World's Coffee Crop.

According to the Brazilian President's Message to Congress, the world production of coffee in the past year was 36,377,000 bags, of which Brazil produced roughly 28,000,000 bags, or 77·97 per cent. of the aggregate world production. Brazilian exports of coffee in 1928 amounted to 13,881,000 bags, valued at £69,000,000.

Tanganyika Bacon.

The new bacon factory established on the Utete Estates, Iringa District, Tanganyika Territory, 35 miles from Iringa, started operations in February. The Iringa factory, financed by Lord Delamere, cost about £7,000. It possesses a complete canning plant, and began to turn out canned pork products in May. The plans are to handle and convert into prime products some 200 pigs a month. Hams and bacon produced in the factory have been on sale in the Territory for some time, and hotels, restaurants, and householders offer an important market. At its formal opening in April, a large number of farmers were present, and excellent samples of bacon, ham, brawn, Wienerwurst, Frankfurt sausages, and lard were displayed and sold. The factory is the only one of its kind in the Empire, and is about two hundred miles from a railway.

Icelandic Fisheries.

The major part of the exports from Iceland during the past year, as always, consisted of fish and fish products. The fishing fleet has been enlarged and a number of motor-boats and new line-fishing equipment bought. The fishery has been exceptionally profitable during the past year, and the total catch during 1928 was estimated at 88,000 short tons, as compared with 66,000 in the year 1927.

The demand has been very good, with slowly increasing prices, and consequently larger sales. The entire catch has been disposed of, so that stocks are low.

CIGARS
BIG BOY, YO' AIN'T GWINE T' PASS ME OFF WID NO PACK O' BUTTS WHEN MAH MOUF GETS T' WATERIN' FO' A FIVE DOLLAR BOX O' CANDY!
REACH FOR A CHUCKIE INSTEAD OF A SWEET

This cartoon from the "Manufacturing Confectioner" suggests that America's sweet tooth cannot be filled with nicotine.

Safety Last.

The English Government has just abolished a tax on tea in England that has been in effect there for three centuries. It seems finally to have decided to agree with us.—*Conf. Journal*, Philadelphia.

Openings for British Trade

British firms may obtain the names and addresses of the persons or firms referred to in the following notices by applying to the Department of Overseas Trade, personally or by letter (Development and Intelligence), 35, Old Queen Street, London, S.W. 1.

Applications for names and addresses must be sent to the Department of Overseas Trade, except where otherwise stated.

Confectionery, Biscuits, etc.—A merchant and commission agent of Cali, Colombia, is desirous of securing the representation of British firms manufacturing confectionery, biscuits, tinned provisions, jams, essences in general, and spirits; also of a British firm exporting wines. The firm are also interested in metal and boot polishes. (Ref. No. 496.)

Various Foodstuffs.—A firm of commission agents and wholesale grocers of good standing in Lisbon wish to obtain the representation of British exporters of sugar, rice, dried codfish (bacalhau), spices and comestible oils, but especially rice. (Ref. No. 491.)

Oranges, Onions, Soya Oil.—A firm in the Free City desires to secure the representation for Danzig of exporters at Hull of oranges and onions, also of manufacturers or exporters at Liverpool of raw soya oil. (Ref. No. 469.)

Bakers' and Confectioners' Requisites.—A firm in New York desires to get into touch with British manufacturers of machinery, utensils, labour-saving devices, food products, etc., used by bakers and confectioners. Applicants are prepared to purchase or to act as agents. (Ref. No. 473.)

Confectionery (except Toffees and Liccrice) and Easter and Christmas Novelties.—A firm of agents employing a large number of travellers covering Western Ontario and the provinces of Manitoba and Saskatchewan desire to obtain the representation of manufacturers of the above. A member of the firm is visiting the United Kingdom this month. (Ref. No. 482.)

Foodstuffs and Allied Lines.—A manufacturers' agent, established in Sydney, desires to obtain the representation of British manufacturers of foodstuffs and allied lines, in which he claims to be able to introduce business. This agent is at present in the United Kingdom. (Ref. No. 459.)

Waxed Paper.—A firm of manufacturers' agents in Capetown desires to obtain the representation of a British manufacturer of good quality waxed papers for the confectionery trade. (Ref. No. 483.)

Canned Goods, Pickles, Dried Fruits, etc.—A recently established agent in Montreal, who was for twelve years with a Canadian firm of meat packers, desires to obtain the representation of exporters of provisions and groceries, such as canned goods, jams, pickles, dried fruits, and nuts on a commission basis. (Ref. No. 465.)

Agent's Services Offered.—A Cuban commission agent, established in Santiago de Cuba, is desirous of getting into touch with British exporters of Oriental spices, cinnamon, etc., and Rangoon and Siam rice. The agent in question also desires to secure the representation of British manufacturers of calcium carbide and linen piece-goods. (Ref. No. 438.)

Books Reviewed

Nutrition and Dietetics. Professor E. P. Cathcart, M.D., D.Sc., F.R.S. Ernest Benn. 6d.

Professor Cathcart's little book gives a useful summary of the nature of proteins, fats, and carbohydrates, the three classes of substances which form the bulk of our food. Chapter VIII., "Quantitative Problems," is one of the best descriptions of how the energy expenditure of the body is measured, and how the energy requirements under different conditions of life are calculated. It is the branch of nutrition with which Professor Cathcart has been closely concerned in recent years. The quantity of protein needed, a subject in which he is interested, is also very well considered. In fact, this chapter is the cream of the book. Other chapters deal with the water and mineral salt requirements. The latter is not up to expectations. Recognition is given to the necessity of including accessory substances or vitamins. A good, but too brief, account is given of recent work on vitamin A and vitamin D. The space allotted to vitamin B is meagre. Little more is said than that it is present in natural foodstuffs and is absent from the manufactured white flour and white rice. The first statement leads to wrong conclusions, for vitamin B is not found in *all* natural foods. Seeds and the internal organs of animals are the chief foods in which vitamin B is found; very little, or none, is present in leaves, roots, and fruits. Vitamin C is considered in more detail and the importance of fresh fruits and vegetables as a preventive of scurvy made clear. Of all the vitamins, vitamin C is the most easily destroyed by exposure to high temperatures and oxidation, and for this reason Professor Cathcart states that the great majority of dried or preserved or canned food preparations contain little or no vitamin C. He appears to be unaware that the modern processes of canning fruits and vegetables are carried out under vacuum and that it has been proved that fruits canned under these conditions retain their full vitamin C value. Owing to the absence of oxygen, subsequent heating of canned fruits, etc., before serving is less injurious to the vitamin than the ordinary domestic cooking processes. It is to be hoped that in a later edition the author will remove the ban which he has placed upon such a convenient and valuable class of foods.

R. H. A. PLIMMER.

Oranges. World Production and Trade. Memorandum prepared by the Empire Marketing Board. E.M.B. 15. 1s.

More oranges are annually imported into the United Kingdom than into any other country, and recent years have seen a steady expansion in the trade. There has been a corresponding increase in production, and the present Memorandum, with its series of valuable statistics, presents an up-to-date survey from which the present state of trade in oranges can be rapidly gathered. The growing importance which this fruit is assuming in the Dominions makes the Memorandum of special interest from the point of view of the trade and development of the British Empire.

Vinegar Manufacturer and Examination. C. A. Mitchell, M.A., F.I.C. Griffin. 10s. 6d.

The necessary conditions for the acetification of alcoholic liquids were known, empirically, long before it was recognised that the oxidation of alcohol into acetic acid was a process analogous to the fermentation of sugar into alcohol, but it was only during the last century that attempts were made to explain their significance. In the book under notice, which remains the standard work on the subject in England, the successive advances made in enzymic research by Berzelius, Liebig, Pasteur, Nägeli, and more recently by Buchner and Gaunt are passed under review.

A wide field is covered, including acetic bacteria, chemical reactions in acetification, acetic acid, preparation of the gyle, treatment of the crude vinegar, methods of examination, and the characteristics of different vinegars.

Journal of the Ministry of Agriculture. April, 1929. 6d.

Principal Contents: Sugar Beet Demonstrations, 1928; Modern Fruit Canning Operations; Stomach Worms in Sheep; Cost Accounts on an Institute Farm; Successful Control of Apple Scab in the Wisbech Area; Red Spider Mite; April on the Farm; Notes on Manures; Notes on Feeding Stuffs; Miscellaneous Notes.

Scottish Journal of Agriculture (quarterly). 1s.

Principal Contents: The Agricultural Output of Scotland; An Interesting Co-operative Egg-Collecting Station; Special Agricultural Industries of Canada; Insect Pests, No. IV.; Milk Substitutes in the Rearing of Calves; The Biologist on the Farm, No. XXXIII.; Population and Rewards in Agriculture; Egg Production in Tiree and Uist; Science and Practice and Statistical Tables.

Correspondence

To the Editor.

SIR,

In your June issue I notice that Mr. A. Ll. Matthison says I am "quite wrong in assuming that lacquers will answer with certain products only."

In Bulletin 103-A, released early in 1928 by the National Canners' Association, the following statement appears: "Enamelled cans have been used to an increasing extent for more than fifteen years, not only with red fruits, but also with some of the more acid vegetables that have a pronounced flavour of their own, such as beets and pumpkin. The enamel used for these products cannot be used with certain vegetables that have a more delicate flavour, such as asparagus and string beans, because it imparts an objectionable flavour to the product. During recent years a special lacquer has been developed for products that have a tendency to form iron sulphide discoloration, especially corn. This special lacquer will not answer for acid products such as fruits, but has been found to prevent the iron sulphide discoloration for which it was developed and also prevent the general tarnish to the inside of a can due to the formation of tin sulphide."

In FOOD MANUFACTURE, October, 1928, Dr. Hermann Serger wrote: "A good varnish, properly burnt in, serves its purpose in the majority of cases," and referred to the effects upon the varnish of certain kinds of cherries and greengages; also showing that rhubarb should not be preserved in metal cans as oxalate "first destroys the lacquer at spots where it can be easily attacked."

I think that these two opinions alone certainly justify my remark that the "results hitherto" show lacquers will answer with certain products only. The fact that up to the present they have *not* answered with all does not in anyway indicate that we cannot provide suitable lacquers for canning fruits and vegetables which have hitherto affected the lacquers used.

Yours, etc.,
E. J. NORTON.

* * *

Enquiry

56. We should like to get into touch with a manufacturer of Iodised Salt and Extract of Liver, or any firm marketing these commodities.

Commercial and Legal News

(The Editor does not accept responsibility for any errors which may occur in the following notices.)

London Gazette Information

Joint Stock Companies.

The names of the undermentioned Companies have been struck off the Register and dissolved:

Armstrongs Confectionery Company, Limited.
Birmingham and District Ale and Porter Bottlers' Association, Limited.
Ideal Health Sweetmeats, Limited.
Dairies, Limited.
Farmers Dairies (Willesden), Limited.
British Food Shops, Limited.
National Health Flour Company, Limited.
V. P. Vinegar Company, Limited.
Weald of Kent Farm Products Company, Limited.
Liverpool Syrup Company, Limited.
National Agricultural Home Grown Food Producers, Limited.
Sterilvac Milk Bottler (Albro Patents), Limited.

Voluntary Liquidations.

(Note.—Voluntary liquidations may in some instances, refer to companies in course of reconstruction.)

FRESH FRUIT SYRUPS, LIMITED. Resolved, June 12, that the company cannot, by reason of its liabilities, continue its business; that it be wound up voluntarily, and that Mr. G. D. Wilson, C.A., 29, Gt. Pulteney Street, W. 1, be appointed liquidator.

THE GELATINE MANUFACTURING COMPANY, LIMITED. Resolved, May 27, that the company having ceased to function and the whole of its liabilities having been discharged, the same be wound up voluntarily, and that Mr. E. L. Donald, C.A., Atlantic House, 46, Holborn Viaduct, E.C. 1, be appointed liquidator for the purpose of such winding-up.

MIDLAND COUNTIES BACON CURING COMPANY, LIMITED. Resolved, June 3, that the company cannot, by reason of its liabilities, continue its business; that it be wound up voluntarily, and that Mr. F. T. Naylor, of Gloucester Mansions, Cambridge Circus, W.C. 2, be appointed liquidator.

TEASDALES DAIRIES, LIMITED. Resolved, May 28, that the company be wound up voluntarily, and that Mr. F. T. Kenyon, Accountant, of Penrith, be appointed liquidator.

SOMERSET DIRECT DAIRIES, LIMITED. Resolved, May 27, that Mr. F. J. Sully, C.A., 84-85, High Street, Weston-super-Mare, and Mr. W. H. Cork, Accountant and Auditor, 19, Eastcheap, E.C., be appointed joint liquidators of the company for the purpose of voluntarily winding-up, in place of the said Mr. F. J. Sully.

NATIONAL DAIRY FARMERS, LIMITED. Resolved, May 16, that the Society cannot, by reason of its liabilities, continue its business; that it be wound up voluntarily, and that Mr. A. J. Gray, Accountant and Auditor, 48, Pilgrim Street, Newcastle-upon-Tyne, be appointed liquidator of the Society.

PACKER (THE TABLE DELICACY SPECIALIST), LIMITED, 32, Talbot Road, Blackpool (in voluntary liquidation). A general meeting of the members of this company will be held at the office of Mr. S. S. Waterhouse (Solicitor), 49, Queen Street, Blackpool, on July 4, at 12 noon, to receive the report of the liquidator showing how the winding-up has been conducted.

GREAT PONTON DAIRIES, LIMITED (in voluntary liquidation). A general meeting of the members of this company will be held at 8, St. Peter's Church Walk, Nottingham, on July 8, at 3 p.m., to receive the report of the liquidator showing how the winding-up has been conducted.

Partnership Dissolved.

HEARNE AND CARR (J. E. Hearne, of 32, Lucy Street, Old Trafford, near Manchester, manufacturer, and J. B. Carr, of Haddon, Norbury Grove, Hazel Grove, Stockport, Chester, traveller), carrying on business as Pickle Manufacturers. Mutual dissolution as and from June 4.

Bankruptcy Acts:

Public Examination.

TEASDALE, WILLIAM, residing and carrying on business at Willow Farm Dairy, Hoylake Road, Moreton, Chester, Dairyman. (8 of 1929) Public Examination, 11 a.m., July 24, at Court House, Pilgrim Street, Birkenhead. Adjudication, June 7.

New Companies

J. N. NICHOLS AND COMPANY, LIMITED. (238303) Regd. March 28, 1929. To take over the bus. of a mnfg. chemist, drug mcht., and essence distiller cd. on at Britannic Works, Ayres Road, Manchester, as "J. N. Nichols and Company." Nom. Cap.: £40,000.

A. BROMBY, SON AND COMPANY, LIMITED. (238051) Regd. March 20, 1929. To take over the bus. of a dripping refiner and edible fat mcht. cd. on at Back Tweed Street, West Hartlepool, as "A. Bromby." Nom. Cap.: £2,000.

JAMES CRESTOR, LIMITED. (238063) Regd. March 20, 1929. Mora Road, Cricklewood, N.W. 2. To carry on the bus. of mnfrs., blenders, and preservers of meats, vegetables, sauces, confectionery, and all other foodstuffs, etc. Nom. Cap.: £1,000.

JOHN SWIFT, LIMITED. (238317) Regd. March 30, 1929. 11, Higher Oswald Street, Smithfield Market, Manchester. To take over the bus. of wholesale fruit brokers and mchts. cd. on as "John Swift." Nom. Cap.: £10,000.

LONDON ICE BISCUIT COMPANY, LIMITED. (238318) Regd. March 30, 1929. To take over the bus. cd. on at 76 and 78, Pomeroy Street, S.E. 14, as the "London Ice Biscuit Company." Nom. Cap.: £3,000.

SARSONS, LIMITED. (238368) Regd. April 2, 1929. 20, Soho Square, W. 1. To take over the bus. formerly cd. on by Sarsons, Ltd., and to carry on the bus. of vinegar brewers and maltsters, etc. Nom. Cap.: £1,000.

SELNOR SYNDICATE, LIMITED. (238369) Regd. April 2, 1929. To acquire certain lands and bldgs. at Bognor, and to carry on the bus. of hotel, restaurant, and café proprs., etc. Nom. Cap.: £5,000.

BOAM BROTHERS, LIMITED. (238392) Regd. April 4, 1929. 85, Northumberland Street, Nottingham. To take over the bus. of a baker and confectioner cd. on at Nottingham by W. Boam. Nom. Cap.: £1,000.

PHILIP MATTHEWS (LANDORE), LIMITED. (238419) Regd. April 4, 1929. To carry on the bus. of grocers, provision mchts., confectioners, hay and corn mchts., etc. Nom. Cap.: £250.

DAVIES, HAYNES AND DODD, LIMITED. (238846.) Whipcord Lane, Chester. To take over the bus. of herbal brewers and confectioners cd. on at Chester by W. J. Davies and C. H. Haynes. Nom. Cap.: £2,000.

HURSTLEIGH, LIMITED. (238849.) 62, Church Street, Stoke Newington, N. 16. To carry on the bus. of bakers and confectioners as formerly cd. on at 62, Church Street, Stoke Newington, and 91, Dunsmure Road, Stamford Hill, by W. S. Hurstleigh. Nom. Cap.: £500.

MIDDLETON AND PRINCE, LIMITED. (238906.) High Street, Tideswell, Derby. To take over the bus. of grocers, provision mchts., etc., cd. on at Tideswell as "Middleton and Prince." Nom. Cap.: £500.

PIGGERIES (NO. 1), LIMITED. (238909.) To enter into an agmt. for the acquisition of a lease of land and bldgs. at 91, High Street, Chatham; to establish shops, refreshment rooms, and depôts; to mnfre. pork pies, etc. Nom. Cap.: £10,000.

ARTHUR FOLEY AND COMPANY, LIMITED. (239014.) 50, St. John's Place, Preston. To take over the bus. of a wholesale grocer cd. on at Preston as "Arthur Foley and Company." Nom. Cap.: £10,000.

LYCO YEAST TABLET COMPANY, LIMITED. (239056.) Lamb Distillery, Church Street, Chiswick, W. 4. To acquire from the Standard Yeast Company, Limited, the goodwill and trade mark of the Lyco Yeast Tablet, and to carry on bus. as indicated by the title. Nom. Cap.: £6,750.

POLLY'S, LIMITED. (239063.) To carry on the bus. of mnfrs. of and dlrs. in toffee and sweetmeats, etc., at Tanfield Mill, Tanfield, near Ripon. Nom. Cap.: £1,000.

H. B. STANSBY AND SON, LIMITED. (239095.) To take over the bus. of a grocer, provision mcht., and wine and spirit mcht., etc., cd. on at Church Street, Ripley, Derby, by H. B. Stansby. Nom. Cap.: £4,000.

JAMES MCGUIRE AND SON, LIMITED. (239128.) 40, Willis Street, Ashted, Birmingham. To take over the bus. of a wholesale and retail dairyman cd. on at Birmingham by J. McGuire. Nom. Cap.: £2,000.

VITACREAM, LIMITED. (239166.) To carry on the bus. of mnfrs. of artificial cream, etc. Nom. Cap.: £6,000.

WYMONDLEY DAIRIES, LIMITED. (239208.) 91, St. Peter's Street, St. Albans. To carry on bus. as indicated by the title. Nom. Cap.: £500.

CROFT BROTHERS, LIMITED. (239210.) To take over the bus. of grocers, provn. mchts., corn mchts., and pharmaceutical chemists cd. on at High Street, Tibshelf, Derbyshire, as "Croft Brothers." Nom. Cap.: £6,000.

JOHN STOKES AND SON (TARPORLEY), LIMITED. (238404.) 1, Hunter Street, Ches. To take over the bus. of millers and corn mchts. cd. on by J. Stokes, Tarporley, and G. Stokes, Ellesmere, Salop. Nom. Cap.: £6,000.

BRITISH ONLY, LIMITED. (238414.) 27, Morley Street, Bradford. To carry on the bus. of wholesale and retail mchts. in confectionery and biscuits, cutlery, tobacco, toys, etc. Nom. Cap.: £500.

GOODWIN SIMONS (LONDON), LIMITED. (238485.) To carry on the bus. of fruit, flower, vegetable, and produce growers, packers, mchts., importers and exporters, etc. Nom. Cap.: £50,000.

JAMES TEMBY AND COMPANY, LIMITED. (238508.) 85, Gracechurch Street, E.C. 3. To carry on the bus. of genl. mchts., dlrs., wine and spirit shippers, etc. Nom. Cap.: £1,000.

BUZZARD VITAMINS, LIMITED. (238528.) 26, North Street, Leighton Buzzard, Beds. To enter into an agmt. with H. C. Tooley, Limited, to acquire the trade mark or marks "Buzzard" relating to game, poultry, and cattle foods and concentrated cereal vitamin food, etc. Nom. Cap.: £2,500.

ISAAC TUCKER AND COMPANY, LIMITED. (238534.) Turk's Head Brewery, Gateshead. To take over the bus. of brewers, hotel proprs., and property owners, etc., cd. on in Gateshead and neighbouring places by Isaac Tucker and Company. Nom. Cap.: £78,300.

C. W. PARRY (SCUNTHORPE), LIMITED. (238551.) 7, Manley Street, Scunthorpe, Lincs. To carry on the bus. of wine and spirit mchts., etc. Nom. Cap.: £1,000.

GODDARD AND HAMER (BLACKPOOL), LIMITED. (238577.) To take over the bus. of wholesale confectioners cd. on at Devonshire Square Works, Devonshire Square, Blackpool. Nom. Cap.: £2,000.

ALPHOS, LIMITED. (238631.) Pyewipe Road, Pyewipe, Great Grimsby. To take over the bus. cd. on at Pyewipe by E. L. Richardson, together with the trade mark "Alphos," and to carry on the bus. of mnfrs. of and dlrs. in edible foodstuffs, etc. Nom. Cap.: £3,000.

STANFORDS AND VINCENTS STORES, LIMITED. (238648.) To take over the businesses of grocers, provn. mchts., and genl. dlrs. cd. on at Broadway, Rustington, Sussex, by A. P. Stanford, and at Rustington, by W. Atterbury, as "Vincents Stores." Nom. Cap.: £5,000.

BELMONT CANDIES COMPANY, LIMITED. (238672.) 55, Belmont Road, Wallington, Surrey. To carry on the bus. of confectioners, sellers of sweets, etc. Nom. Cap.: £500.

H. SWEETING, LIMITED. (238677.) 76, Hamlet Road, Southend-on-Sea. To acquire the leasehold interest in 76, Hamlet Road, Southend-on-Sea, and to carry on the bus. of wine and spirit mchts., grocery, and general store dlrs., etc. Nom. Cap.: £1,000.

HAYWARDS MINERAL WATER COMPANY, LIMITED. (238764.) To take over the bus. of a mineral water mnfr. cd. on at 43 and 45, Milton Street, Maidstone, as "W. Hayward." Nom. Cap.: £8,000.

LEAT AND COMPANY, LIMITED. (238822.) To take over the bus. of a wholesale grocer cd on at 86, Redcliff Street, Bristol, as "E. H. Leat and Company." Nom. Cap.: £3,000.

NIBLETT AND COMPANY, LIMITED. (239230.) To take over the bus. of a mineral water mnfr. and cider and biscuit mcht. cd. on at Stroud, Cheltenham, Gloucester, and Cirencester, as "Niblett and Company." Nom. Cap.: £6,000.

UNITED KINGDOM FOOD PRODUCTS, LIMITED. (239236.) 170, Piccadilly, W. 1. To carry on the bus. of potato crisp mnfrs., mnfrs. and purveyors of provisions, etc. Nom. Cap.: £500.

W. GREATREX AND COMPANY, LIMITED. (239237.) To carry on the bus. of dlrs. in and importers and exporters of meat, poultry, game, and fish, etc. Nom. Cap.: £3,000.

PALMER AND JAMES, LIMITED. (239414.) To take over the businesses of wine and spirit mchts., etc., cd. on at Bournemouth and Boscombe, as "W. J. Palmer and Sons" and "James and Company," respectively. Nom. Cap.: £12,000.

EUROPEAN MEAT AND PACKING CORPORATION, LIMITED. (239459.) To carry on the bus. of financiers, capitalists, underwriters, importers, exporters, preservers and packers of meat, fish, poultry, game, and eggs, etc. Nom. Cap.: £50,000.

LEWIS CLARKES, LIMITED. (239546.) The Old Sheep Market, Worcester. To carry on the bus. of brewers and wine and spirit merchants formerly cd. on at Worcester as "Lewis Clarke and Company." Nom. Cap.: £80,000.

FUTURE AUTOMATIC RESTAURANTS, LIMITED. (239570.) To carry on the bus. of mnfrs. of and dlrs. in automatic machines or buffets; refreshment room proprs., etc. Nom. Cap.: £10,000.

W. F. TANNER AND SONS, LIMITED. (239620.) 2, Hornsey Street, Holloway, N. 7. To carry on the bus. of mnfg. confectioners as formerly cd. on at Holloway by W. F. Tanner. Nom. Cap.: £1,500.

OBROS WHEAT PRODUCTS, LIMITED. (239651.) To carry on the bus. of mnfrs. of and dlrs. in sausage binders, rusks, ham and fish dressings, and any products of wheat, etc. Nom. Cap.: £5,000.

PADIHAM AERATED WATER COMPANY, LIMITED. (239654.) Smithy Gate, Padiham. To take over the bus. cd. on at Padiham, Lancs., by the Padiham Aerated Water Company, Limited. Nom. Cap.: £2,200.

BOZON-VERDURAZ, LIMITED. (239670.) To carry on the bus. of mnfrs. of, agents for, and dlrs. in bread, biscuits, and foodstuffs, etc. Nom. Cap.: £1,000.

WEST OF ENGLAND EGG PRODUCERS, LIMITED. (239722.) 15, St. James's Place, S.W. 1. To carry on bus. as indicated by the title. Nom. Cap.: £2,500.

GRACE'S RESTAURANT AND CAFÉ, LIMITED. (239740.) 12, Sandgate Road, Folkestone. To take over the bus. cd. on at Folkestone as "Grace's Restaurant and Tea Lounge." Nom. Cap.: £1,500.

Current Literature

Fruit and Vegetable Products

366. Improving Quality by Grading Raw Materials for Canning. James and Donaldson. (*Canner*, 68, 22, 17-20.)

367. The Present Position in Pectin Research. Ehrlich. (*Braunschw. Kons. Z.*, 1929, 23, 8.)

368. The Determination of Sugars in Marmalade. Lippich. (*Z. Anal. Chem.*, 77, 3-12.)

369. Vitamins in Canned Foods. Eddy, Kohman, and Halliday. (*Ind. Eng. Chem.*, 21, 347.)

370. Testing Instruments in the Cannery. Lyons. (*Canning Age*, 1929, *June*, 476-477.)

371. New Preserve Standards. (*Ibid.*, 489-491.)

372. By-Products of the Sugar-Cane Industry. Guerrero. (*Planter and Sugar Manfr.*, 82, 17, 321-323.)

373. Annual Summary of Chemical Laboratory Reports from Natal Sugar Factories. Dodds and McRae. (*Ibid.*, 325-326.)

374. Drying of Sugar Beet and Extracting the Sugar from it in a Diffusion Battery. Karaviev and Palkin. (*Bull. Sakharotrest*, 1928, 5, 40-44.)

375. Pressure Evaporation in the Beet Factory. Vesely. (*Z. Zuckerind. Czecho-Slov.*, 53, 204-206.)

376. Available Carbohydrate Content of some Fruits and Vegetables. Bell, Long, and Hill. (*J. Metabol. Res.*, 1925-1926, 7-8, 195-197.)

377. Association of Vitamin A with Greenness in Plant Tissue. Crist and Dye. (*J. Biol. Chem.*, 81, 525-532.)

378. Grading Apples for Canning. James and Donaldson. (*Canner*, 68, 20, 18-19.)

379. Extraction of Apple Juices in the Manufacture of Jelly. Fellers. (*Mass. Agric. Exp. Stn. Res. Bull.*, 1928, 15, 218-251.)

380. The Production and Marketing of Cider. Pt. I. Young. (*Fruit Prod. Jour.*, 8, 9, 10-12.)

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381. Rôle of Carbohydrates and Proteins in the Staling of Bread. Karacsonyi. (*Z. Unters. Lebensm.*, 56, 479-484.)

382. Peroxides in the Cereal Industries. Van der Lee. (*Food Ind.*, 1, 8, 352-353.)

383. Comparison of some Properties of Normal and Frosted Wheat. Johnson and Whitcomb. (*Mont. Agric. Ex. Stn. Bull.*, No. 204, 1-66.)

384. Determination of Maize Flour in mixture with Wheat Flour. Milski. (*Ukraine Chem. J.*, 3 (Tech.), 183-208.)

385. Studies in Cereal Chemistry. Pt. III.—The Basic Materials. Fairbrother. (*Ind. Chem.*, 5, 52, 199-201.)

Dairy Products

386. The Testing of Casein. Davies. (*Ind. Chem.*, 5, 52, 202-204.)

387. Determination of the Degree of Heating of Milk. Weinstein. (*Z. Unters. Lebensm.*, 56, 457-467.)

388. Chemistry of Sour Milk. Van Slyke. (*N.Y. Agric. Exp. Sta. Tech. Bull.*, No. 140, 1-14.)—A review.

389. Presence of Mixed Glycerides in Butter from Cows' Milk. de'Conno and Scopinaro. (*Annali Chim. Appl.*, 19, 55-65.)

390. Cotrone Cheese. de'Conno and Frattura. (*Ibid.*, 65-75.)

391. Calcium of Cheese. Blunt and Summer. (*J. Home Econ.*, 20, 587-590.)

392. Commercial Lecithins. Sonol. (*Rev. fac. quim. farm. Univ. La Plata*, 4, 2, 3-40.)

393. The Freezing Point of Milk. van Raalte. (*Analyst*, 638, 266-268.)

394. Guaiacum Reaction of Milk. Schroetter. (*Milch. Forsch.*, 6, 533-537.)

395. Washing Powders for Dairy Use. Phillips, Mack, and Frandson. (*Mass. Agric. Exp. Stn. Tech. Bull.*, 13, 179-187.)

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396. The Nitrogen Question (in Brewing). Oliver. (*Ibid.*, 191-200.)

397. Colouring Matters of Beet Molasses. Garino, Regé, and Rubino. (*Giorn. Chim. Ind. Appl.*, 11, 61-63.)

398. Soil Respiration and Fertility. Reinan. (*Festschr. Stoklasa*, 1928, 305-318; *Bied. Zentr.*, 57, 107-108.)

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400. Further Studies of the Chemical Nature of Vitamin A. Drummond and Baker. (*Biochem. J.*, 23, 2, 274-291.)

401. Price Control. Gaskill. (*Glass Container*, 8, 7, 8-9.)

402. Opportunity to the Canning Industry at Chicago's World's Fair. (*Canner*, 68, 23, 16.)

403. Amounts of Antirachitic Vitamin in Different Samples of Cod-Liver Oil, Milk, and Butter. Coward. (*Quart. J. Pharm.*, 1, 534-538.)

404. Causes of the Deterioration of Fats and Oils. Davies. (*Chem. Age*, 517, 489-492.)

405. Flesh Proteins of Various Animals. Beck and Caspar. (*Z. Unters. Lebensm.*, 56, 437-457.)

406. Food Gelatin. Brieffer and Cohen. (*Ind. Eng. Chem.*, 21, 264-265.)

407. Hydro-Extractors. Internat. Lab. Office. P. S. King and Son, pp. 102, 45.

408. Relative Potentials of Tin and Iron. Kohmann and Sanborn. (*Food Ind.*, 1, 8, 345-347.)

409. Mechanical Stabilisation of Emulsions. Doan. (*Ibid.*, 356-360.)

410. Atomic Weights for 1929. (*Anal.*, 638, 295.)

411. Difference in Osmotic Concentration between Yolk and White of Egg. Straube. (*Rec. Trav. Chim. Pays-Bas*, 48, 49-82.)

412. Fish Meals. The Effect of High Temperature on Nitrogen Partition. Ingvaldsen. (*Can. Chem. and Met., April*, 22-25.)

413. Sugar Mnfg. Machinery. (*Planter and Sugar Mnfr.*, 82, 19, 361-364.)

414. Frozen Yeast. Staiger and Glaubitz. (*Z. Spiritusind.*, 52, 116.)

415. Metals in Connection with Beer. Mathews. (*J. Inst. Brew.*, 35, 181.)

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416. Apparatus for Determining the Water Content of Barley and Malt. Winisch. (*Woch. Brau.*, 46, 96-97.)

417. Solubility Tests of Castor Oil. Trevithick and Lauro. (*Oil and Fat Ind.*, 6, 27-29.)

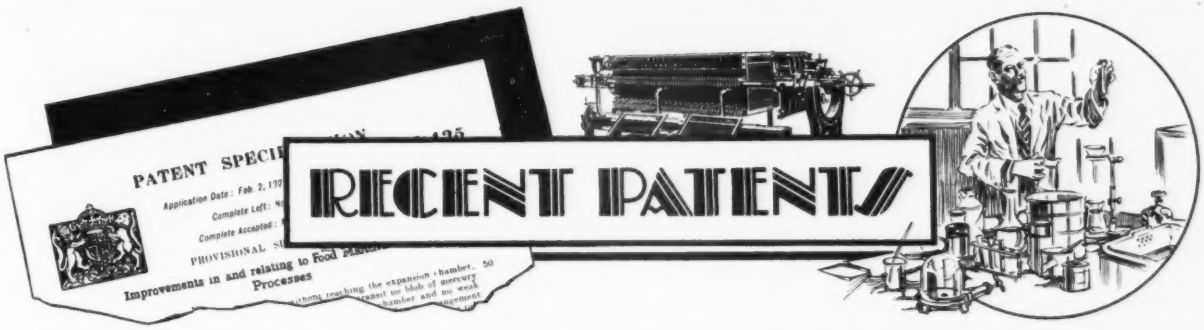
418. Analysis of the Bitter Substances of Hops. Windisch Kolbach and Winter. (*Woch. Brau.*, 46, 101-131.)

419. Detection, Determination, and Oxidation of Sulphur Dioxide (in Foods). Henville. (*Anal.*, 54, 228-231.)

420. Determination of Unsaturated Fatty Acids of Expressed Cacao Butter. Kaufmann. (*Z. Angew. Chem.*, 42, 402-406.)

421. Distinction between Expressed and Extracted Cacao Butter. Aufrecht. (*Chem. Zeit.*, 53, 318.)

422. Determination of Alcohol in Wines and Spirits. Semichon and Flanzy. (*Ann. Falsif.*, 22, 139-152.)



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office.

308,486. **Nut-crackers and devices for breaking shell-fish.** RICHARDS, H. TEMPLE-, 2, Hill Street, Knightsbridge, London.

308,529. **Sugar.** WIESE, H., AND ANGLO-SCOTTISH BEET SUGAR CORPORATION, LIMITED, 26, West Nile Street, Glasgow.

In the purification of saccharine liquids by the addition of lime to the solution and saturation with carbon dioxide and/or sulphur dioxide, the syrup produced in the preliminary affining stage is mixed with the residual cake from a previous saturation, heated to about 180° F. and filtered. The affined sugar solution may be mixed with another portion of residual cake, heated to about 180° F. and filtered. The filtrate requires only a single addition of lime and treatment with carbon dioxide or sulphur dioxide. Specification 12642/11 is referred to.

308,692. **Refrigerating.** DEUTSCHE GASGLUHLICHT-AUER-GES., 16, Rotherstrasse, Berlin.

308,793. **Refrigerating.** SIEMENS-SCHUCKERTWERKE AKT.-GES., Siemensstadt, Berlin.

308,979. **Making coffee infusions.** DELSUC, E. (known as DELSUC, C.), Rue Jeanne d'Arc, Nancy, France.

309,097. **Cereal food preparations.** CLARK, G. M., 53, Chancery Lane, London.—(Matro Ges., Heilbronn-on-Neckar, Germany.)

An alimentary or dietetic preparation is made by mixing the rootlets of malted grain, or a flour made from such rootlets, with dry or diluted or dissolved alkalis or alkaline-reacting salts or lime, and adding the resultant mass to any desired corn meal. Either prior to, or after, the admixture of the alkalis, etc., the rootlets or the flour may be subjected for a short time to a roasting operation at a temperature above 100° C., and substances containing vitamin may subsequently be added.

309,139. **Treating flour, meal, etc.** NAAMLOOZE VENNOOTSCHAP INTERNATIONALE OXYGENIUM MAATSCHAPPIJ, Novadel, Deventer, Holland. —(Assignees of Gelissen, H. C. J. H.; 7, Stationsplein, Roermond, Holland, and Hooft, F. V.; 257, Bryand Street, Buffalo, New York, U.S.A.)

Bleached products; treating with solid substances; treatment by damping.—In heating flour, meal, or other edible milling products with organic peroxide compounds for improving the keeping and baking qualities and for bleaching purposes, a substance facilitating volatilisation of the peroxide compound is added. Solid or liquid peroxides and solid or liquid volatilisation facilitating substances may be used. When solids are employed they may be used in the amorphous form.

309,154. **Casings and containers for sausages, jam, ointments, etc.** SOC. ANON. LA CELLOPHANE, 5, Avenue Percier, Paris.

In making a casing or container for moist products, such as sausages, jam, honey, pharmaceutical products, such as salves and ointments, by the method described in the parent Specification, the edges of the cellulose sheet are welded by phosphoric acid at 60° B., or by an ammoniacal solution of copper oxide, or by sulphocyanate of calcium, or by sulphuric acid at 66° B.

309,195. **Sugar.** SCHERING-KAHL-BAUM AKT.-GES., 170, Müllerstrasse, Berlin.

Polysaccharides in vegetable material such as sugar beet, chicory roots, Jerusalem artichoke tubers, are stabilised and preserved to render possible a recovery and working up of the sugar material at any desired time by treating the starting material in the form of a paste with an agent which prevents fermentation without being narcotic. Such agents include carbon monoxide, hydrogen cyanide, and fluorine compounds.

309,404. **Packing food.** ATLANTIC COAST FISHERIES, COMPANY, 16, Exchange Place, New York, U.S.A.—(Assignees of Taylor, H. F.; 16, Exchange Place, New York, U.S.A.)

309,405. **Smoking fish, etc.** ATLANTIC COAST FISHERIES COMPANY, 16, Exchange Place, New York, U.S.A.—(Assignees of Taylor, H. F.; 16, Exchange Place, New York, U.S.A.)

Fish, meat, and other foodstuffs are preserved by treatment with smoke to which a volatile alkali such as ammonia has been added to neutralise the acids and substantially destroy the aldehydes therein. The smoke may be made alkaline by addition of an excess of the alkali. A separate smoke generator may be provided, from which the smoke is conveyed by fans, etc., through a duct to the smokehouse, ammonia being added thereto in the duct or in the outlet nozzle.

According to the amount of ammonia added, the colour of the treated foodstuffs may be varied from yellow to reddish-brown.

309,417. **Ice-cream.** HATMAKER, J. R., 19, Avenue Kléber, Paris.

An ice-cream mixture is made by drying a part of a given quantity of natural whole milk and incorporating the solids obtained therefrom with the remaining part of the milk, cream, sugar and/or other flavouring, with or without a stabilising agent such as gelatine, being then added and the whole intimately mixed together.

309,480. **Weighing and packeting.** HESSER MASCHINENFABRIK-AKT.-GES., F., 99, Olgastrasse, Canstatt, Stuttgart, Germany.

Weighing-apparatus fitted to packeting machines.—In a packeting machine wherein the packages are conveyed stepwise and in succession to various stations for filling, weighing, closing and other treatment two roughly filled packages are fed simultaneously forward by the distance of two stations or by two feed grippers, are then swung away from the packages and moved back to their left-hand positions, an empty package being at the same time brought to the station 1 and roughly filled. The gripper 2 alone is now swung forward to operative position and a feed step to the right is again made by all the grippers, thus bringing the roughly filled packet to the idle station 2 without, however, disturbing the packages at the weighing stations 3, 4.

309,519. **Food preservatives; condiments.** HADDAN, R., 31, Bedford Street, Strand, London.—(Smoked Products Company; 5th Street, Cincinnati, Ohio, U.S.A.)

A food preservative, condiment, etc., is prepared by bringing smoke from burning carbonaceous material, preferably hickory wood, into contact with common salt which is agitated so as to admix the smoke therewith. The salt may be treated in a chamber or drum, which is preferably in movement, having means for electrically precipitating the smoke constituents therein.

309,601. **Confectionery; chocolate.** OPPENHEIM, E., 12, Bratislavska, Brünn, Czecho-Slovakia.

For making chocolate or other confectionery rich in vitamins, the finished but still plastic mass is allowed to cool to a considerable extent and is then exposed to the action of ultra-violet rays while being stirred, or spread in a thin layer, or subdivided as by spraying.

309,639. **Sheet-metal presses.** RHODES, C. J., Grove Iron Works, Wakefield.

309,654. **Cake containers.** LEACH, A. M., 51, Brougham Road, Seacombe, Wallasey, Cheshire.

309,689. **Testing eggs.** DUNLOP, W. R., Agricultural Economics Research Institute, Parks Road, Oxford.

308,484. **Applying capsules to bottles.** JACKSON, H. D., Glen Lodge, Buchanan Road, and WHITE, F., Fraclama, Belvedere Road, both in Walsall.

309,119. **Bleaching flour, etc.** STRAUB, J., 29, Verhulstweg, Santpoort, Holland.

Bleached products; treatment by damping; treatment by heating; treating with solid substances; organic peroxides.

305,217. **Cereal and vegetable preparations; bread, etc.** PASSEK, F., 166, Hammerlandstrasse, and BOLLMANN, H., 3, Alsterdamm, both in Hamburg, Germany.

A dough for making bread, biscuits, etc., is made by adding to cereal flour a quantity of gluten and one or more albumen-rich meals—*e.g.*, soy-bean meal, cotton-seed meal. The gluten is first rubbed into the meal and the mixture then added to the cereal flour. By way of example, the dough may consist of 76 grams of bread or rye flour, 3 grams of moist gluten, 8·6 grams of soy-bean meal, 0·4 grams of calcium carbonate, 60 grams of water, 40 grams of leaven, 3 grams of yeast, and 1 gram of common salt. The dough is fermented at 30° C. for 1¼ hours and baked at 220° C. for thirty-five minutes.

306,469. **Fishing.** VIGNERON, J.-B. J. A., 29, Quai Valin, La Rochelle, Charente-Inférieure, France, and V. D., LIMITED, Iddesleigh House, Caxton Street, London.

307,255. **Closures for containers.** MCDONNELL, A. F., 1341, Jefferson Avenue, Scranton, Pennsylvania, U.S.A.

307,267. **Straining liquids.** THOMPSON, H. A., Wansbeck Ironworks, Morpeth, Northumberland.

307,895. **Freezing fish, etc.** DAHL, O., and KJORSTAD, E. A. H., 29, Quai Valin, La Rochelle, Charente, France.

308,033. **Centrifugal machines.** BROADBENT AND SONS, LIMITED, T., and BROADBENT, B. L., Central Ironworks, Huddersfield.

308,233. **Centrifugal machines.** EMPSON CENTRIFUGALS, LIMITED, 47, Victoria Street, and NOEL, F. A. G., 28, Southwick Street, Hyde Park, London.

308,253. **Bleaching flour.** CHEMISCHE INDUSTRIE VAN HASSELT, 4, Drentschestraat, Amersfoort, and MEELFABRIEKEN DER NEDERLANDSCHE BAKKERIJ, Maashaven, Rotterdam, both in Holland.

Flour is treated by the addition thereto of a small quantity of a solid or liquid substance which substance or mixing with the flour rapidly generates nitrogen oxides or nitrosylchloride. As examples, one part of a mixture of equal parts of nitrosyl sulphuric acid and active silicic acid is mixed with twenty thousand parts of flour; one part of the double compound of ferric chloride and nitrosyl chloride is mixed with twenty-five thousand parts of flour; a saturated solution of nitrosyl chloride in benzol is sprinkled into the flour; a saturated solution of nitrosyl chloride in glacial acetic acid to which about 10 per cent. bromine or 5 per cent. chloride is added is sprinkled into the flour.

308,287. **Harvesting sugar-beet, etc.** STUBBS, E. C., Ivy House, Whiston, near Penkridge, Staffordshire.